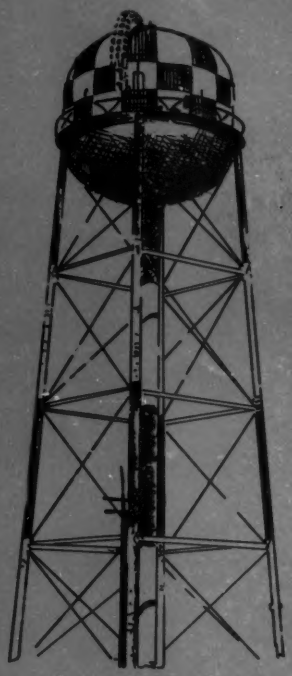
NAVY CIVIL Engineer

Spring 1986

Underwater engineer-divers inspect elevated water tanks

page 10

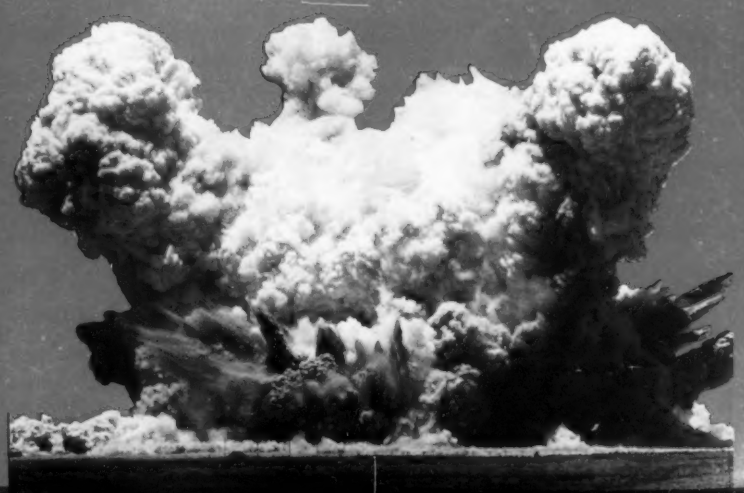


Sometimes work assignments are more fun than work

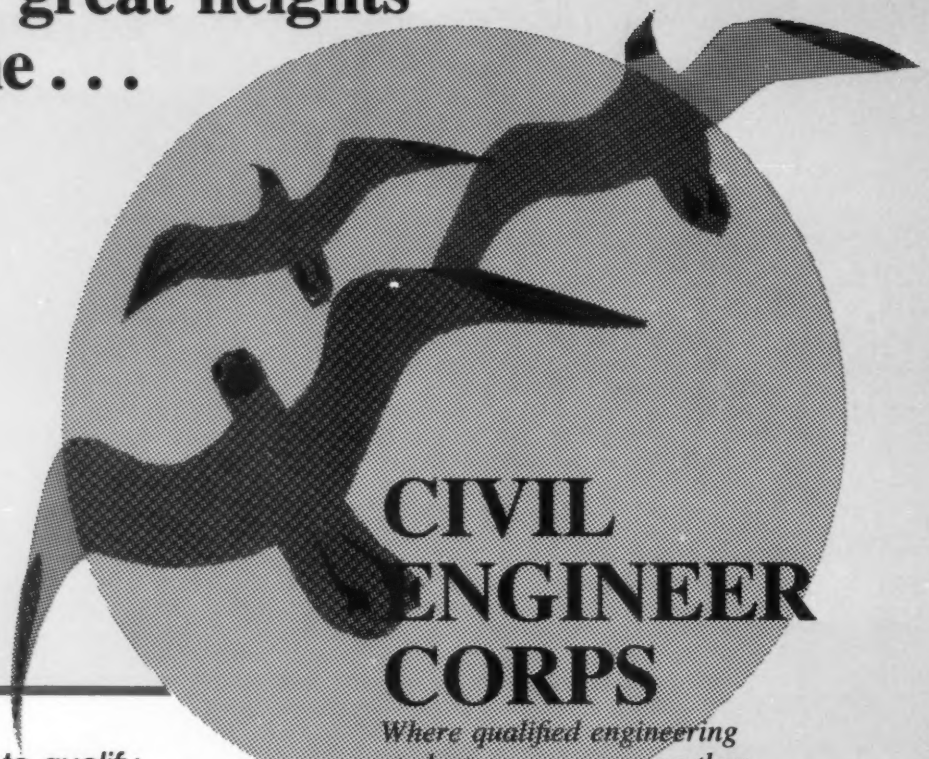
see page 23

Navy conducts high-explosive, above-ground detonation near Albuquerque

page 13



Your career can soar to great heights with the . . .



CIVIL ENGINEER CORPS

Where qualified engineering students may earn more than $1,000 per month — For details call 800 327-NAVY

How to qualify . . .

● Students must be U.S. citizens, between the ages of 19 and 35 years, and within 12 months of graduation and enrolled in an engineering degree program accredited by the Accreditation Board for Engineering/Technology or architecture program accredited by the National Architectural Accrediting Board . . . ● and meeting current scholastic and physical standards upon acceptance into the program. They will be placed on active duty as Officer Candidate, Seaman (E-3), prior to receiving their baccalaureate degrees . . . ● Upon graduation they will be required to complete Officer Candidate School, Newport, R.I., and the basic course of instruction at the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. . . . ● Following completion of Officer Candidate School, they will be obligated to remain on active duty for four years . . . ● Applicants are not limited to civil engineering, but are eligible if completing ABET accredited engineering degrees in mechanical, electrical, construction, ocean, or petroleum. Applicants enrolled in architecture must be pursuing study programs of at least five years' duration in an institution accredited by the National Architectural Accrediting Board.

Contact your nearest CEC officer

LCdr. Mike Moore, CEC, USN
NAVFAC, Code 09MA1
200 Stovall Street
Alexandria, VA 22332
Phone (202) 694-3635 AV 224-3635

Lt. Brad Beisswanger, CEC, USN
NAVFAC, NORTHDIV, Code 09R
Philadelphia, PA 19112
Phone (215) 897-6488 AV 443-6488

Lt. Dave Stewart, CEC, USN
NAVFAC, SOUTHDIV, Code 09F
P.O. Box 10068
Charleston, SC 29411
Phone (803) 743-0711 AV 794-0711

Lt. Elizabeth Clarkson, CEC, USN
NAVFAC, PACDIV
Pearl Harbor, HI 96860
Phone (808) 471-8471 AV 315-8471

Lt. Rick Marrs, CEC, USN
NAVFAC, WESTDIV, Code 09L1
P.O. Box 727
San Bruno, CA 94066
Phone (415) 877-7093
AV 859-7491

LCdr. Chuck Gorum, CEC, USN
Naval School, Civil Engineer Corps Officers
Port Hueneme, CA 93043
Phone (805) 982-5655
AV 360-5655

Lt. Steve Iselin, CEC, USN
Public Works Center
Building 1A
Great Lakes, IL 60088
Phone (312) 688-2324
AV 792-2324

Cover

The diversity of assignments in the Civil Engineer Corps is shown on the cover of this issue. Everything from explosions on the desert to underwater diving hundreds of feet in the air to a "Ride for Life" on a cable on Okinawa.

NAVY CIVIL Engineer

Spring 1986 Vol. XXV, No. 4

FEATURES

Soil erosion reduced with use of honeycomb sand grid 2
By Lt(jg). Donald H. Gatchalian and Shujie Chang
A new way to use engineering fabrics preventing soil erosion

Handicapped family housing for military? 4
By Allen W. O'Brien
The author answers the question posed in the title.

The customer expects too much! 6
By Cdr. John F. Conroy
Some advice on how to keep the customers satisfied.

Divers inspect underwater in elevated tanks 10
By Wade F. Casey
Underwater divers find work in elevated tanks.

"Dust Devil" almost botches tests with above-ground (desert) explosives 13
By LCdr. Lee L. Anderson, Jr.
The crew was almost ready to begin explosive tests and then a desert "dust devil" came along. The results are described.

USE Program can reduce cost & risk ... 20
By Renato G. Decal
A program to reduce the danger of working with solvents is described.

World's largest hyperbolic medical facility certified 22
By Dr. Michael Yachnis and Robert Johnston
A tri-service effort to build a new kind of medical facility is described.

When work becomes fun! 23
By Lt(jg). Richard Root
An exhilarating "Ride for Life" is described and shown pictorially.

A new construction material to consider — sulphur concrete 24
By LCdr. K. W. Mlynarski and W. C. McBee
The author explains how sulphur can be used in the construction game.

Quality Circles: Their use as motivators for design excellence 26
By LCdr. Neil B. Hall
A method for strengthening the working relationship between design engineers and construction representatives was designed and they say it works!

Pearl Harbor Shipyard CPAF utilities contract completed 29
By Jeanne A. Light
This program became a real challenge that was eventually whipped. The author tells how.

NEXT ISSUE

READERSHIP SURVEY RESULTS

DEPARTMENTS

editorial 5
speaking from topside . 9
advice of counsel 12
photo-news 16
situation report 18
basic class 176 graduates 27
basic class 177 graduates 31
comments/questions .. 32

JOHN PAUL JONES, JR.
Rear Admiral, CEC, USN
Commander
and
Chief of Civil Engineers
FREDERICK G. KELLEY
Commodore, CEC, USN
Vice Commander
and
Deputy Chief of Civil Engineers

Published Quarterly by Naval Facilities Engineering Command Alexandria, VA 22332

The Navy Civil Engineer (ISSN 0096-0419) is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401. Price: $3.25 per domestic copy, $4.06 per foreign copy. Annual subscription rates: $12.00 for domestic subscribers; $15.00 for foreign subscribers. Send remittance only to the Superintendent of Documents. Application pending for entry as a controlled circulation publication at Orange, Calif.

POSTMASTER
Send address changes to Publication office:
The Navy Civil Engineer, Code C20M, Naval School, Civil Engineer Corps Officers, Port Hueneme, CA 93043. Tel: (805) 982-3104; Govt. Autovon 360-3104; Federal Telecommunications System (FTS) 799-3104.

Issuance of *The Navy Civil Engineer* (NAVFAC P-330) is approved in accordance with Department of the Navy Publication and Printing Regulations NAVEXOS P-35. It does not alter, amend or supersede official regulations, orders or directives. Cost of printing is charged to appropriate funds for maintenance and operations of the Naval Facilities Engineering Command.

The Navy Civil Engineer is intended for the information of regular and reserve personnel of the Civil Engineer Corps, United States Navy, and key civilian employees of the Naval Facilities Engineering Command, subordinate commands and other mission-oriented activities.

LES HELSDON
Editor

JOY ARDALAN
Contributing Artist

KAREN TATE
Circulation

Soil erosion reduced with use of honeycomb sand grid

LT(jg) DONALD H. GATCHALIAN, CEC, USNR
P.E., Calif.
and
SHUJIE CHANG, CIVIL ENGINEER
E.I.T., Calif.
Naval Civil Engineering Laboratory
Port Hueneme, Calif.

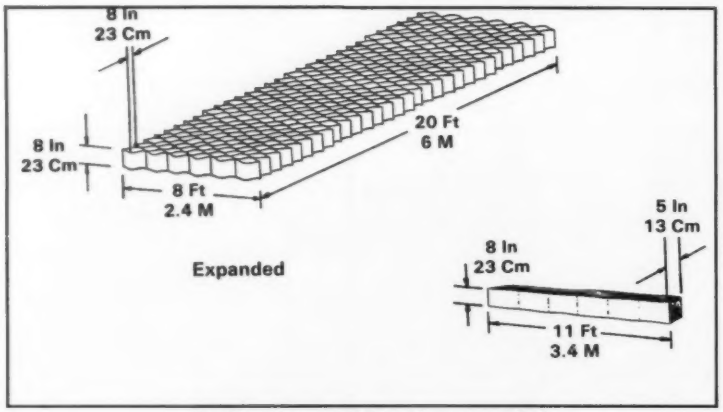
Civil engineering fabrics, commonly known as geotextiles, are synthetic fibers made most commonly of polypropylene, polyester, or polyamide (nylon). They are permeable textile materials used with foundation soil, rock, earth or any other geotechnical engineering-related material as an integral part of a man-made project, structure or system.

This technology has been in existence since the 1930s, but many uses of geotextiles were not realized until the late 1950s. Recent uses have been to solve construction problems associated with drainage, subsurface soil mixing, and soil erosion. When used for drainage purposes, the fabric retains soil while allowing free passage of water.

The fabric eliminates subsurface soil mixing by keeping the subgrade and base material from mixing. To reduce soil erosion, the fabric provides tensile strength to reinforce soil and prevent sliding of particles.

In California and most parts of the country, geotextiles are regularly used to solve problems involving drainage of pavement systems, erosion control for slopes and embankments, and construction of surfaced and unsurfaced roads.

Another material that is in the same category of synthetic construction products is the honeycomb sand grid developed by the U.S. Army Engineer Waterways Experiment Station (WES). The grids are made of expandable, plastic, cellular elements that are expanded and filled with sand at the site. (Although engineering fabrics and sand grids are structurally different, both will be considered as geotextiles.) in this article.)



Sand grid expanded and unexpanded.

So why do the Seabees need this technology? Geotextiles can reduce construction effort in horizontal construction, can correct or deter erosion problems encountered worldwide, and can be used as alternatives to MO-MAT and AM-2 mating for construction of expedient roads. Proper use of sand grids and sand can replace the more costly and heavier MO-MAT and AM-2 in many applications. Also, use of these products would enhance the capabilities of the Naval Construction Force (NCF) and result in significant savings in time, labor and cost.

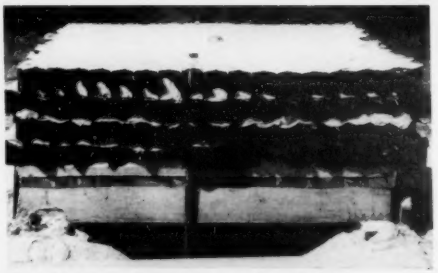
Although all types of geotextiles are worth discussing in detail, the sand grid system deserves special attention. WES demonstrated the system in 1983 during the Joint Logistics-Over-the-Shore II exercise at Fort Story, Va.

A quarter-mile section of sand grid reinforced road on the beach was constructed and paved with rapid cure (RC-250) liquid asphalt. Traffic tests with 100 Army and Marine Corps vehicles were conducted for a three-month period; performance results of the sand grid system were excellent (August 1985 issue of *The Military Engineer*).

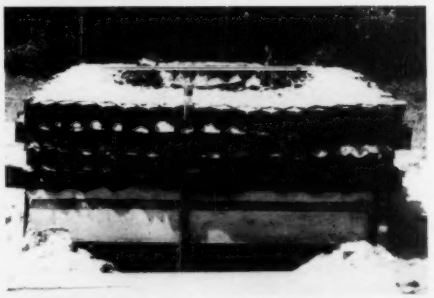
Additional tests were conducted using truck axle loads of 53,000 pounds for 10,000 passes with only slight rutting. The same truck could make only 10 passes in unconfined sand before becoming bogged down in 11-inch ruts.

The Naval Civil Engineering Laboratory, through the Thirty-First Naval

Bunker utilizing sand grid. Sand bags were installed in the opening.



Four layers of sand grid before blast of 9.5 pound TNT.



Sand grid after the blast. Sand bags were found to give equal protection.

Construction Regiment, also tested sand grids for bomb-damaged runway repair. It was determined that by using sand grids, the traditional crushed stone base course could be eliminated.

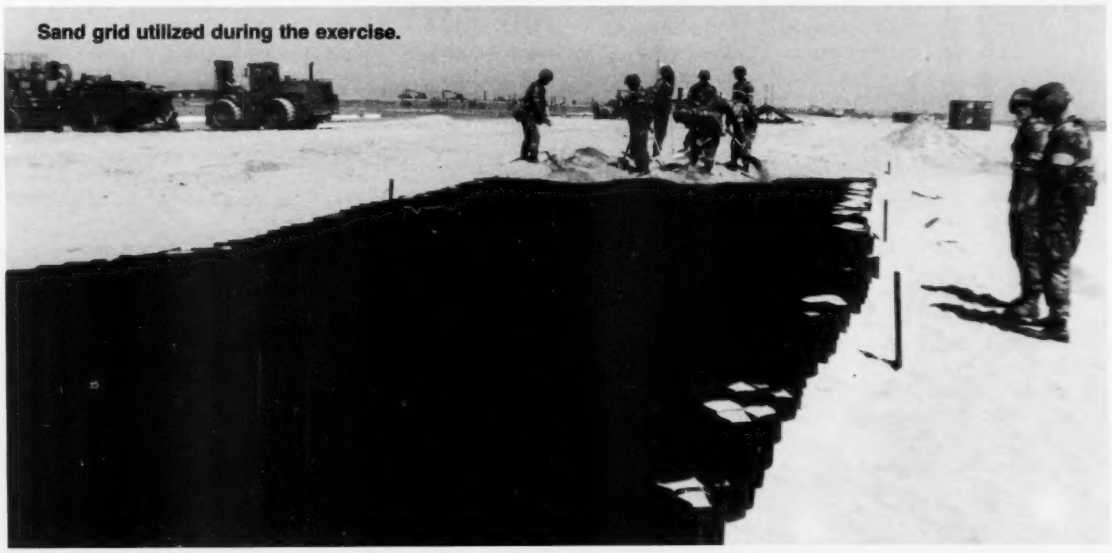
Most recently, the sand grid beach roadway was again demonstrated during the August 1985 Amphibious Logistics-Over-the-Shore exercise at Silver Strand Beach, San Diego, Calif. Because of local environmental restrictions, the RC-250 asphalt sealer was not used. The sand grid was found to work extremely well even without the sealer. Traffic tests were conducted using a 107,030-pound rough terrain container handler (RTCH).

Thirty passes were made without a container load, and an additional 120 passes were made with the RTCH carrying a 44,700-pound container load. The maximum rut observed was less than three inches, and no apparent damage to the road system was observed.

An investigation of the use of sand grids to replace sandbags for fortifying overhead protection is also underway. Initial tests concluded that sand grids offer the same degree of protection as sandbags with a considerable saving in the time required to construct above ground overhead protection.

A technical manual is being prepared to provide interim guidelines for Seabee use of engineering fabrics, which are gaining widespread acceptance by both the construction industry and government agencies. With proper training and guidelines, this important technology can provide the NCF with significant savings and an alternative to the older methods of construction. □

Sand grid utilized during the exercise.



Handicapped family housing for military?

By ALLEN W. O'BRIEN
Supervisory Housing Management Specialist
Atlantic Division, NAVFAC

Should military housing being constructed under the Section 801/802 demonstration project be required to have handicapped-equipped units? Should our design criteria and specifications for MILCON family housing projects include a requirement to construct units that are handicapped equipped? If so, what percentage of our units should be handicapped equipped? What is involved in equipping a unit for the handicapped?

These are real questions the housing management specialists responsible for family housing requirements in the Navy must start to recognize. Although the number of handicapped military personnel is in all probability lower than the community average, the housing authorities are responsible for providing safe and decent housing for all service members and their families.

With housing having been identified as a major factor in the retention of our military members, housing authorities can no longer ignore that portion of our population that are physically handicapped. The days of thinking of only our service member have vanished; we must also recognize the needs of their families and dependents.

Improving the quality of life of our service member is critical to retaining the technical expertise necessary to ensure mission accomplishment. A quick survey of the inventory under the cognizance of the Atlantic Division revealed there are no Navy family housing units that are handicapped equipped. Some minor concessions, such as ramps, have been added where needed, but not much more.

In those geographical regions that are participating in the Section 801/802 demonstration project and are having the family housing units constructed on private land, the local and state building codes regarding handicapped units will prevail. For example, in Virginia the Uniform Statewide Building Code required that one percent of the units (in a project greater than 20 units) be fully handicapped equipped.

This includes wide doorways, wide hallways, metal grab bars, tall toilets, short sinks, etc., and must meet the American National Standard Specifications for Making Building and Facilities accessible to and usable by Physically Handicapped People (ANSI A117.1-1980). The validity of the one percent figure for military-controlled assets needs to be analyzed.

A review of the specifications on recent MILCON projects revealed that no provisions exist within the units to accommodate the physically handicapped. Certainly there is a need for the Navy to provide handicapped-equipped units for our service members, but the question is what percentage and to what extent?

Analysis of Virginia code and utilization revealed that the one percent figure (amended in 1984 and reduced from four percent) is still too high. Of the 663 handicapped units surveyed, only 195 were actually occupied by persons with a physical handicap. Most of the remainder were vacant and a few were occupied by non-handicapped families. One can readily understand why a non-handicapped family would not wish to move into a handicapped-equipped unit.

Although the utility of the unit is not impaired, psychologically these units are difficult to fill with non-handicapped families. The units are institutional in appearance and emulate a hospital environment. This example of poor utilization (44 percent) of units constructed for handicapped actually occupied by handicapped families could never be tolerated in the DOD/Navy system where 98 and 99 percent utilization is the goal.

The dilemma is perplexing, and to date nothing is being done to alleviate the problem. An alternative is proposed that would accommodate handicapped military families and yet not adversely affect utilization, nor would it require a non-handicapped family to live in an "instutional" housing unit.

Future MILCON and lease construct prospects should be designed and constructed to include a provision for one-half percent of all units to be "handicapped adaptable." This means the units should have wide doorways, removable cabinets under the sinks, larger baths and kitchen areas (five feet of turning area), extra studs in the wall (to accommodate grab bars), adaptable toilets, etc.

The units should be designed to ANSI standards so that necessary handicap features could be added to meet the needs of the particular handicapped occupant. If the unit is not needed for a family with a handicapped member, the grab bars could be removed, the holes spackled and painted, the cabinets reinstalled, etc., and the unit could be utilized by a non-handicapped family.

The only visible signs to indicate the unit was designed for the physically handicapped would be the wider inteior doorways — and few of us would complain about a 36-inch-wide interior door: the furniture would actually fit through the doors! If these changes were incorporated in the design of all new family housing construction projects, little or no additional cost would incur.

The Navy should experiment with this approach in Section 801 housing. With the government endorsing such a proposal and signing a 20-year lease, certainly local and state building code officials would consent to waive the requirement to construct one percent of the units to ANSI standards if reasonable assurances can be given that provisions exist to accommodate the handicapped. □

From legend to leader

(fiction of course)

By LCDR J. A. McCONNELL, JR. CEC, USN

A wise man once said to me, "Son, if you hope to make admiral, avoid discussing sex, religion and politics in social company." This sage advice continues to serve me well ten years after my commissioning. I have, however, amended it slightly to include another controversial topic of discussion — leadership. This was not a decision taken lightly.

As an ensign fresh out of the Naval Academy I *knew* leadership. Four years of Annapolis had made me wise beyond my years and I was anxious to share my enlightenment with those deprived souls serving in the fleet. They had been removed, as if in exile, from Mahan, Decatur, Nimitz and other naval legends from whom I drew inspiration. I seized every opportunity — parties, happy hours, staff meetings — to bring my contemporaries up to speed on leadership.

Heroes sustained my philosophy and I knew that I would someday ride the crest of their collective wave to similar accomplishment. I was so confident in my approach that if torpedoes had been fired at me, I surely would have damned them and proceeded full speed ahead. Torpedoes I could handle; a chief petty officer, however, would be my Trafalger.

It was a typically hot, humid September in the Caribbean and I greeted my first duty station with characteristic confidence and enthusiasm. "Turn to, here I am," I seemed to say as I strutted that tropical base looking for opportunities to lead through historic example. "Hey mister, don't you salute officers?" I snapped at a young petty officer who was too busy unloading a truck to remember his military courtesies. Halsey would have had him for lunch, but, recalling that compassion tempers the impatience of greatness, I simply put the offender on report.

"This place needs a lot of work," I thought to myself. "Just the kind of challenge they promised at the Academy."

I continued my mission of search and destroy. Admiral Ernest J. King, known for his tough, unbending style, would have wanted it that way.

As base housing officer I had ample opportunity to explain the meaning of sacrifice to the wives of many of our young petty officers. "Sailors in the *USS Monitor* withstood temperatures in excess of 130 degrees Fahrenheit during their battle against the *Merrimack*. I'm sure, ma'am, that you and your twelve children will survive this pleasant tropical weather without your air conditioner. I will, however, get the repairmen out to your quarters after they finish with the admiral's house." This reasoning seemed to cut short further argument.

I was not surprised when my department head put me in charge of the military division — my first command. I remembered that Oliver Hazard Perry had similar responsibilities at the same point in his career. The fact that the division head position had been vacant for months prior to my arrival meant nothing to me. This was destiny and I would make the most of the opportunity. "Quarters tomorrow at 0700," I told the division chief, "Class 'A' uniform."

"But sir," the chief responded, "these men are *Seabees*. After quarters they have to build roads, clean out sewers and climb utility poles. We normally reserve class 'A' inspections for the last Friday of every month."

"These men are professionals," I argued, "they'll do as I say. I want spit-shined boots, starched caps and polished brass. Oh yeah, make sure each one knows the chain of command from the president on down to the division head."

"Aye, Aye sir," the chief said, somewhat tight-jawed. "They'll be ready."

I was encouraged by the results of the inspection. The men obviously wanted, and needed, strong military leadership. I ordered weekly inspections and extended the work day by two hours to increase productivity. There were some complaints, but didn't Marine Lt. Presley O'Bannon get complaints from his troops when he forced them to march 600 miles across the Libyan desert during the campaign against the Barbary pirates?

Things in the division were fine for a while, but they slowly began to sour. I blamed the chief. He was always riding the men about something. On one occasion I overheard him chewing out one of our young enlisted men. I wasn't interested in the reason for the confrontation. What bothered me was that the chief had the poor judgement to discipline a troop during a period of declining morale. This was clearly counter-productive and I intervened. "Chief," I said, "I don't know what this boy has done but I'm sure he had good reason." Then, turning to the trembling constructionman I said, "that's alright son, he chief didn't mean anything by it. Go back to your duties and forget this ever happened."

"Yes sir, thank you, sir, anything you say, sir," he shouted as he dashed out of sight.

Well, the chief, who was a heavy smoker and consumed large quantities of black, caffeinated coffee, turned an inhuman shade of burgundy before my eyes.

Continued on next page

editorial

(Continued from page 5)

"Ensign, may I see you privately in your office?" His lips barely moved.

"Sure Chief, Ray Spruance always had time for his men and so do I."

The chief slammed the door behind us. "Ensign, I wouldn't know Ray Spruance if he came up and kissed me on the lips, but I do know Seabees. That man you just cavalierly dismissed was badmouthing you. As a matter of fact, he compared you to a rather odoriferous anatomical feature of the nether region. Even though he made good sense, I considered it my duty to disallow such disrespect. Twenty-one years of service will do that to you, sir; tends to make you a professional.

"I teach my people to respect the rank if they can't respect the person. Rank, sir, is about all you have left. You are arbitrary, insensitive and unreasonable. These men are human! They respond positively to loyalty, fairness and reason. They respond negatively to pretense, dictatorships and selfishness. And they are most effective when their leaders allow them to function within a clear chain of command which encourages communication up, as well as down. These people weren't born to serve you. They'll bust their butts for you if you give them a good reason, but they have their limits. You demand, without offering rewards. You order, without offering explanation. And you expect, without satisfying expectations. Frankly, sir, you're a mess! If you're willing, I'll teach you how to be a leader in today's Navy, but first you have to forget what you learned at Annapolis. Be yourself. You, too, are human."

The chief, of course, was right and with his help I redefined my approach to leadership. I reinstated the chain of command and became its most strident supporter. I made it a point to sit down privately with each one of my men, on a frequent and regular basis, to talk about personal and professional matters. When I had difficult news to pass to the division, I delivered it as honestly as I could, and with full explanation. The influence of my undergraduate experience began to fade.

Today, these basic principles of leadership seem elementary and second nature. They form the foundation for an on-going process of development and maturation. Annapolis will always be my alma mater, but it was my division chief who made me realize that leadership is far more personal affair than the chiseled stone and painted canvas of Bancroft Hall would have you believe.

The great ones — Mahan, Decatur, Nimitz — are ultimately not honored because they were heroes, but because they, too, were human. They also fall into the same category as birth control, Jerry Falwell and Republican re-alignment. I never discuss them at cocktail parties. □

Got something to write about?

The magazine depends entirely upon contributions — YOUR contributions. If you're a member of the Civil Engineer Corps, Seabees, or an employee of NAVFAC, and you have information you want to share with other readers, please send it in.

Your subject matter should tell of problems and pitfalls they might avoid; tell of new programs and future plans; be significant technical developments or break-throughs; changes in procedures, systems, or methods; or new management concepts. Occasionally, we like a historical feature or a personal experience, but it must be unusual and interesting.

If you have questions, please call Autovon 360-3104, FTS-3104, or Commerical (805) 982-3104 and let's talk about your article plans.

MAGAZINE PRODUCTION SCHEDULE

ISSUE	THEME*	MATERIAL DUE	DISTRIBUTION DATE
SUMMER 1986	Acquisition and Procurement	April 15, 1986	July 1-15, 1986
FALL 1986	Seabees	July 15, 1986	Oct. 1-15, 1986
WINTER 1987	Public Works	Oct. 15, 1986	Jan. 2-15, 1987
SPRING 1987		Jan. 15, 1987	April 1-15, 1987

*General informational articles are acceptable for all issues including those with a suggested theme.

The customer expects too MUCH!

By CDR JOHN F. CONROY, CEC, USN
P.E., Miss.
Executive Officer
Navy Public Works Center
Great Lakes, Ill.

Maybe the customer does expect too much; but, often times that's because we permit the customer to expect too much. If we make the effort to shape those expectations, we can create more of that highly sought after commodity: a satisfied customer; one whose expectations have been met.

We often assume our customers know the facility business. Most of the time they don't; nor is there any reason they should. What they do know is how to run training programs, fly planes, drive ships, provide medical care, or any one of the 101 other things our customers do.

Among the things they don't know about the facility business is what we can and can't do for them, how long it takes to repair a roof, how much it costs to repair a runway, what administrative wickets we must go through to advertise and award a contract and the like. Lacking this knowledge, they may make some assumptions and from those, derive expectations. If we fill in some of the information gaps about our business, we can shape the customers' expectations and give ourselves a better chance of meeting them.

As the first step, we've got to know the customer. What are his or her needs, priorities or problems? We can only do this by getting out and meeting them on their own turf. Just the very act of having the meeting will go a long way toward showing them we care about providing good service. And, while we are learning more about our customers, we can teach them something about us and our constraints.

Some of the concepts we want to convey are material leadtime — easy to relate to since everyone faces waiting periods for supplies; limited manpower — i.e., backlog: inflation — again the customer can relate this to his or her own costs; and contract leadtime.

All of these translate into barriers preventing us from responding immediately to every call. Don't belabor these points because they have enough problems of their own; but, do plant the seed. On a positive note, tell your customer to call personally when experiencing a truly urgent problem. We can't treat them all as emergencies, but we can and should handle the real "hot" job.

We get other opportunities to shape our customers' expectations when we communicate with them on individual jobs. This usually takes the form of providing cost estimates and schedules.

First — the estimate. In the mind of the customer, and remember, that's what matters here, there is no such thing as a preliminary estimate. We can place all the qualifiers we want on it such as "preliminary, tentative, subject to change, dependent upon further definition of scope," and all the other good apple pie and motherhood words

we like to use. All the customer is going to remember is the dollar figure. Therefore, we must make every effort to ensure the estimate covers the cost.

Pick the customer's brain for all the information possible, ask the questions no one has thought of and crank in some contingency. Keep in mind that if we say $80K and it comes out $90K, we've blown it; but if we say $100K and it comes out $90K, we're heroes. Not fair maybe, but that's the real world.

Next — the schedule. The first rule has to be "Don't commit to something you can't realistically meet." The customer's deadline notwithstanding, the schedule you publish must allow for the time it takes to do the things that must be done. If that smacks of being obvious, it should be, but often it seems to escape us.

In our sincere desire to meet our customer's needs, we tend to be the world's greatest optimists. "Approval usually takes three months, but we'll get it in two." "Leadtime on the material is six months, but we'll get it in four." "The weather usually shuts us down in November, but this year we can work until December." Pretty soon we've taken what should be a 14-month project, if all goes well, and committed to doing it in eight. We have set ourselves up for the inevitable "big fall."

When the deadline we're confronted with is simply unattainable, we have to tell the customer that. Knowing 18 months in advance that the deadline must slip is easier for our customers to deal with than finding out two or three months before the scheduled completion that there will be a six-month delay. Include in the schedule, enough intermediate milestones and clarification so it's obvious why it takes this long. We're dealing with intelligent people who are very capable of understanding what has to happen — if we take the time to explain it.

Another key point to press home is the customer's part in meeting the schedule. There are frequently things they must do before we can proceed; things such as scope definition, design review comments and project approval from their major claimant. The schedule must clearly spell out customer responsibilities and what dates must be met if we are to stay on track. When the customer doesn't meet them, we must tell this immediately, "You are delaying your project."

Finally, we must keep customers informed when the inevitable happens and Murphy strikes. They key here is to let the customer know as soon as we know. The more notice we can provide, the easier it is to adjust planning. Don't wait until you're ready to advertise the job to spring up with "The project we thought was $250K is now $400K." You knew that at the 35 percent design stage. The customer should also have known then. Don't wait until the day work is to commence before you divulge the material is delayed two months. The customer should have been told when you found out.

Everyone's expectations are based on their knowledge and experience. You can give your customers the knowledge they need to formulate reasonable expectations of our capabilities. Ignore it and the next time you complain "The customer expects too much!" it will probably be your own fault. □

Join the CEC Reserves — it pays off!

Architects and engineers, part-time job opportunities are available in the Naval Reserve Civil Engineer Corps (CEC) for men and women up to age 35 without prior military service. Direct commissions are available as ensign, CEC, USNR-R.

There is no active duty requirement other than two weeks per year and one paid drill weekend per month with a reserve construction force unit in your area.

Women architects and engineers are eligible and encouraged to join. Retirement benefits are available at age 60 after twenty or more years of qualifying Naval Reserve Service.

Graduation from an accredited school of architecture or engineering, or professional registration plus professional experience is required.

If you're interested in serving your country, broadening your experience and professional contacts, and participating in a challenging and rewarding program, find out about the Reserve CEC. Please contact one of the four area Reserve CEC recruiting officers on the inside back cover for further information.

speaking from topside

Over the past couple years we have witnessed several changes which significantly impact the Naval Facilities Engineering Command and the Civil Engineer Corps. Civilian and high grade ceilings have been eliminated by Congress. The Naval Material Command was disestablished on May 6, 1985. The Secretary of the Navy has established the Materiel Professional Program. Coopers & Lybrand is assisting us in improving Public Works Centers' effectiveness. We are embarked on an extensive quality assurance improvement program in the acquisition of facilities and facilities support. Most recently we are attempting to sort out the impact of the Gramm-Rudman-Hollings balanced budget act. Most of these changes have been for the better and we will have a stronger Command and Corps as a result.

Artificial constraints on high grade and civilian ceilings have existed during my entire career. It is refreshing to be able to make decisions based upon resource availability and not be limited by arbitrary numbers derived through an imperfect process. Although funds remain tight, we can now consider cost-effective in-house options in selecting the method of accomplishment of a task. Taxpayers are the beneficiaries of this major management improvement.

The elimination of the Naval Material Command elevates NAVFACENGCOM to an echelon II Command. We now fend for our resources directly in the OPNAV arena rather than through third party representatives as in the past. We are more in control of our destiny and like it this way. Communications are clearer by our working directly with OPNAV and the Secretariat.

The designators of CEC flags and captains are now 5104. This signifies we are Materiel Professionals (MP). This program, announced by Secretary Lehman on March 15, 1985, is designed to enhance efficiency and management and effectiveness within the Navy by singling out qualified, highly trained officers with the talent

and experience to serve in assignments involving Navy materiel management, logistics, technology, maintainance and readiness. We do not foresee significant changes to the Corps as we phase into the MP program.

Coopers & Lybrand, a consulting firm headquartered in Washington, D.C., has been retained by the Navy to study each NIF activity group and provide recommendations for improvement. We are working with Coopers & Lybrand to improve PWC operations by reducing overhead, upgrading service, and developing a long-range business plan. We have selected PWC Norfolk as the pilot organization to effect these changes. This pilot test will be running during CY-86. Improvements will be exported to other PWCs during and after the PWC Norfolk review.

The most extensive recent change involves our acquisition process. We are embarked on a calculated program to improve the quality of the process by which we acquire facilities, facilities support, utilities, and planning services through contracting.

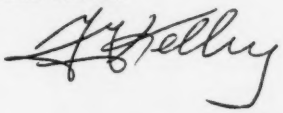
As an initial step, we have changed our EFD organization by removing the 02 Division from under 09A and placing the contracts office directly under the 09. The time was right to do this considering the proliferation of contracting for other than construction and architect-engineer services.

These other contracts, such as FSC, utilities, and master plans have gradually consumed more and more of our contracting effort. Our training of CEC officers and civilians in the acquisition process was deficient so we have established the Naval Facilities Contracts Training Center (NFCTC) at Port Hueneme, and have developed a comprehensive training program for our people involving the NFCTC and other available DOD courses.

Additionally, we are testing a pilot acquisition organization at NORTHDIV. Our objectives are to (1) improve the quality of designs, completed facilities, support and other contracts, (2) deliver facilities and services essentially within time frames proposed, (3) reduce costs by having fewer changes and claims, and (4) improve the overall efficiency and reliability of acquisition procedures and the process. I'm very pleased with our progress to date. Headquarters, EFDs and OICC Trident have moved out smartly.

The Gramm-Rudman-Hollings balanced budget act is the newest challenge on the horizon. Hopefully, by the time this goes to print, we will have the impact sorted out. Regardless of the outcome, we will continue to move forward in providing excellent facilities engineering services to our many clients.

Reinhold Niebuhr said in "The Serenity Prayer" in 1943, "God, give us grace to accept with serenity the things that cannot be changed, courage to change the things which should be changed and the wisdom to distinguish the one from the other." We hope to be acquitted well on the changes underway — only time will tell.



RAdm. Frederick G. Kelley, CEC, USN Vice Commander, Naval Facilities Engineering Command

Divers inspect "underwater" in elevated tanks

By WADE F. CASEY

Inspection of the interiors of elevated and in-ground water storage facilities has previously required de-watering and erection of scaffolding. This has been costly in terms of downtime, loss of potable water and man hours. Some elevated steel tanks cannot be de-watered because they are on standby for fire protection of the only source of water pressure. Some concrete reservoirs cannot be de-watered because they are the only source of supply.

As an offshoot of underwater inspection-ocean engineering expertise, it is demonstrated that these inspections can be effectively and economically performed using self-contained underwater breathing apparatus (SCUBA) and without the expense of having to de-water these water storage facilities.

Using engineer-divers, inspection of the interiors of these structures can be made and conditions found documented either on videotape or still photography. Ultrasonic thickness measurements can be taken on the interiors of steel tanks reaching inaccessible areas such as standpipes or the base of the tank's bowl and without damaging the structure. Measurements of cathodic protection systems can also be readily accomplished. Concrete in-ground tanks or reservoirs can be similarly examined.

According to the American Water Works Association (AWWA) "All water tanks* should be thoroughly inspected at intervals of not more than five years." While this standard goes on to imply that the tank should be drained to inspect the inside surfaces, it was found that through the use of the engineer-diver a more efficient method exists that doesn't require de-watering, post inspection scaffolding removal, cleanup and sanitization.

Inspection crew sets up dive station on tank balcony and prepares to place the engineering inspector in the water.

**The word tank is used to imply steel tanks, standpipes, reservoirs or elevated tanks for water storage.*

But what about diver disinfection/decontamination? Divers are treated with a solution of chlorine bleach prior to entering tanks. They utilize dedicated dry suits that isolates them from the water. Dedicated implys that this suit is used solely for potable water and nothing else. A suit used for pier inspections could contain creosote and diesel impurities and would of course contaminate the water supply. Full face masks or helmets are used to prevent diver contact with the water.

In other words, the diver is isolated from the water from head to toe. Personnel are also required to be in a state of perfect health. The tank chlorination level is raised before and after the inspection as an added precaution. All equipment such as cameras and lights are also disinfected.

Diver's helmet isolates him from contact with the water and eliminates contamination of the water supply.

Engineer-divers prepare to enter in-ground concrete potable water facility. Diver is isolated from the water by dry suit. All equipment is sanitized with a solution of chlorine bleach.

Why engineer-divers? Certified engineers who are also divers can detect areas of distress that are not obvious and which may be overlooked by someone who is a diver but not an engineer. This may be critical especially when discovering a problem which may be of structural significance. A person not having an engineering background may not be familiar with the areas of major or minor distress.

In some instances determination/identification of a significant anomally may be of a life threatening consequence. Also, a public works officer or staff civil engineer must have information critical to projecting maintenance, repair actions as well as longevity of their facilities.

What are these types of inspections going to disclose? For steel structures, information concerning interior extent of coating loss/deterioration can be determined as well as actual measurement of shell plate thicknesses nondestructively using portable ultrasonic test equipment. Cathodic protection systems are examined for the state of anodes and actual potential measurements can be made to determine if the system is actually working.

An improperly maintained cathodic protection system can actually accelerate the rate of deterioration if unchecked. For concrete structures which are usually located on or in-ground, interior surface conditions are examined for rebar exposure, cracks, spalling of concrete, efflorescence and coating loss.

Extent of sedimentation for water tanks can also be determined and presence of any debris such as old formwork and bird nests. Also inspections can be tailored to the specific needs of an activity to include outside areas of the tank, thus offering a comprehensive investigation.

Most warranties on recoating of the interiors of steel tanks carry a one-year warranty against workmanship and defects. By inspecting these tanks with engineer-divers prior to expiration of the warranty period a station could receive assurances that the painting contractor complied with the terms of the contract.

Can repairs be done in the wet? Not all repairs can be done without dewatering. Removal of sediments, however, can effectively be done with the use of underwater vacuums or pumps. Removal of such material may cause damage if removed in the dry because on some in-ground concrete tanks the hydrostatic pressure on an empty tank may cause cracking if the tank is old and in poor shape. Sediments in some tanks may cause damage to pumping station's impellors if the tank is emptied completely.

Interior condition of tank at juncture of wall and ceiling. Note light rust. Tank is in need of new interior coating.

How long does it take to inspect an average-sized tank? Most of the time spent inspecting tanks involves setup and staging of diving equipment particularly when inspection involves elevated heights. Mobilization/demobilization costs associated with orthodox approaches are saved, however, since no scaffolding needs to be erected. In most cases, depending on such things as size, age, material and configuration, a tank can be inspected in a day or less.

On elevated tanks during instances of freezing temperatures, high winds, or thunderstorms inspection may be delayed for obvious reasons. That is why inspections are scheduled, if at all possible, during optimum weather windows.

Most support is required to gain access to a structure, securing cathodic protection systems, sanitization of access point, raising level of water in tank along with increased chlorination before and after inspection. Water samples are usually taken before and after inspections by station personnel.

Compared to conventional methods, inspection using an engineer-diver represents an efficient, economical and less time-consuming method to determine the interior state or condition of potable water storage facilities. □

advice of counsel

By TONY KUSHNIR
Associate Counsel
Real Estate and Housing

"The more it changes, the more it's the same thing."
Alphonse Karr, (1849)
"There is nothing permanent except change."
Heraclitus (571-641 A.D.)

Like so many other "truisms," these often quoted passages seem incongruous. Yet, these passages reflect basic truths which we have all encountered in our personal and professional lives. Like "death and taxes," we can count on the fact that legislative reforms regardless of whether they concern government procurement, military pay and retirement or civil service, will subsequently become the basis for further "reforms." These changes, however, do not occur in a vacuum; they reflect the constant changes undergoing in our society and in our institutions.

As with other aspects of American life, the concepts underlying real estate ownership and its use have undergone fundamental changes over the last 40 years. The use and enjoyment of real property is no longer tied to its ownership. Today, federal and local laws such as zoning codes, historic preservation, wetland protection, transfer of "development rights" have a greater impact upon the use of land than its ownership. Though many of these laws, especially those enacted by local governments, may not directly affect Navy ownership, they can and do have a dramatic effect upon our use of our lands.

What actual benefit is it to own 50,000 acres of land for an air station if a nearby municipality allows the development of high density residential housing under an approach zone or in an area subject to pattern overflights. Similarly, the usefulness of a naval communication station can be seriously impeded by electromagnetic interference created by private uses expressly permitted by a nearby local government.

The Navy, as a major land holding agency, must be attuned to these changes and must be prepared to meet any challenges created by such changes as our land ownership and our basic mission are inextricably tied to one another.

Over the last 40 years, there has been a substantial population increase in the coastal states. With soaring land values, there is a strong incentive for developers to maximize return on their investments by obtaining the most intensive use of their property which they can get approved by the local governments. Local governments, themselves subject to revenue limiting initiatives, are prone to be sympathetic and receptive to any approach which expands the tax base. The end result of such development pressure has shown to be critical. The termination of NAS Los Alamitos in 1977 as a naval air station was primarily due to events occurring off station property.

A Story With A Happy Ending

The lesson to be learned is that the Navy as a landowner must be as prepared to deal with new legal challenges pertaining to real estate/land use as the developer and the local government are today. The focus on the Navy in management of its real property holdings can no longer afford to be directed only at its own facilities but must now extend to areas beyond the "fence."

Sound Navy land management principles must now be sensitive to and address changes in federal, state and local laws affecting land development patterns and use. For instance, while most are familiar with the requirements of the National Environmental Policy Act of 1969, there are virtually a score of other federal statutes and requirements that can impact not only Navy policy and action but private development as well.

Among these are: the National Historic Preservation Act of 1966; Executive Order 11593, Protection and Enhancement of Cultural Environment (inventory of qualified and archeological resources); Endangered Species Act of 1973; Executive Order 11988 (floodplain development prohibition); Executive Order 11990 (wetland protection); Coastal Zone Management Act; and the Noise Control Act of 1972.

Add to this list the multitude of state and local laws and regulations and one can appreciate the complexity of the issues facing developers and property owners today.

Navy knowledge and use of these requirements can pay off not only in the use of Navy lands but in checking and preventing incompatible use of neighboring lands as well. Recently, the Navy was able to stop the development of high-density residential development from occurring in a high aircraft noise and accident potential zone by notifying the Farmer's Home Administration (FmHA) that the development was to occur in an area that exceed FmHA noise standards. FmHA financing, critical to the development, was withdrawn.

This story had a happy ending because of a concerted effort undertaken by the commanding officer of the installation involved, planning and real estate personnel and legal counsel. Because land ownership and use has become so complex, a coordinated, multi-faceted approach involving different disciplines is needed to effectively manage Navy real property holdings today. NAVFAC Counsel's office stands ready to provide advice and assistance so as to assure maximum Navy utilization of its resources. □

THE NAVY IN ALBUQUERQUE?

"Dust Devil" almost botches tests with above-ground (desert) explosives

They say the Navy is not just a job — it's an adventure. But who would imagine that the staid Civil Engineer Corps (CEC) has a billet where an officer would have the opportunity to play Christo? You remember Christo? The artist who wraps bridges in shimmering fabric, converts islands into pink lily pads, and runs fences from hither to yon?

In my case the fabric was mylar. I got to cover acres and acres of desert with it, inflate it with a couple million cubic feet of helium and blow it to kingdom come. Talk about experiential art!

This unusual billet is on the staff of the Field Command, Defense Nuclear Agency, Albuquerque, New Mexico. Field Command is the testing and inspection arm of the Defense Nuclear Agency. It is tasked, among other duties, with creating environments in which experimenters can see how military weapons systems would respond to air blast overpressures.

Field Command is a purple suit outfit (that is, it includes members of all services.) The CEC billet at Field Command is in the Operations Division of the Test Directorate. Not simply a staffer, the CEC officer here gets to go out and labor in the desert.

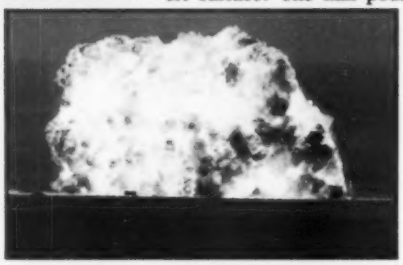
When not laboring in the desert, home port is Albuquerque. Except for having to put up with kidding inquiries about the whereabouts of the "Rio Grande Fleet," Albuquerque is a delightful place for a CEC officer to be stationed. The climate is superb. At an elevation of about 5,000 feet, summers here are not nearly so hot as you might imagine.

With a population of 470,000, Albuquerque has an active cultural life, plenty of shopping, two universities, and a triple A baseball team. Excellent skiing is close at hand in the winter, accessible if you wish by riding a tramway from the city up to Sandia Peak.

But the action is out in the desert. Once a year or so, Field Command conducts a high-explosive above-ground detonation south of Albuquerque on the White Sands Missile Range. The site of the testing is in the heart of *Jornada del Muerto*, the "journey of the dead one." It is a beautiful place, in a rugged sort of way, but you'll want to come equipped not to become the next muerto.

The explosive test in June 1985, was a big one. It would qualify for the *Guinness Book of World Records* as the largest such test to date in the free world (Who knows about the other side?). Nearly 4800 tons of ammonium nitrate — fuel oil mixture (ANFO) were pumped into a hemispherical fiberglass charge container, 88 feet in diameter.

By LCDR. LEE L. ANDERSON, JR.
CEC, USN
P.E., Ca.



The shot went off at 12:20 p.m. . . . before more bags were lost.

That's where the mylar comes in. A thin layer of mylar could be used to hold the helium down without interfering appreciably with the experimental results. We used half-mil mylar, 0.0005 inches thick, reinforced with nylon threads every half inch. It was tied down with strings on 4′4″ centers to spikes driven into the hard-packed desert surface. The nail pounders really toned up their forearms in driving nearly 21,000 of these 12-inch spikes. Afterward it took a 1952 Chevy pickup truck to pull the nails out.

Did I say we used acres and acres of mylar? Enough to perhaps pique Christo's interest. The mylar enclosure nominally measured 400 feet wide by 900 feet long, with an arc-shaped end aimed at Ground Zero. 8.48 acres is a lot of mylar. To get all that mylar deployed without falling all over ourselves, it was divided into eight rectangular segments. We called these segments bags, in spite of their one-sided nature.

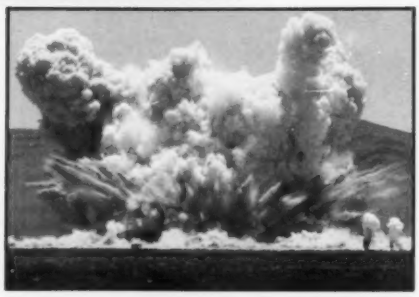
Each bag was deployed from a rolling cart, or dolly, which advanced across the width of the precursor radial as the strings were tied to the spikes.

Some 170 experiments, including shelters, military hardware (U.S. and foreign), and exotic measuring devices, were spotted around the charge. The whole shebang was detonated on the afternoon of June 27, inspiring the cartoonist for the *Albuquerque Journal* to depict us as celebrating the Fourth of July a week early.

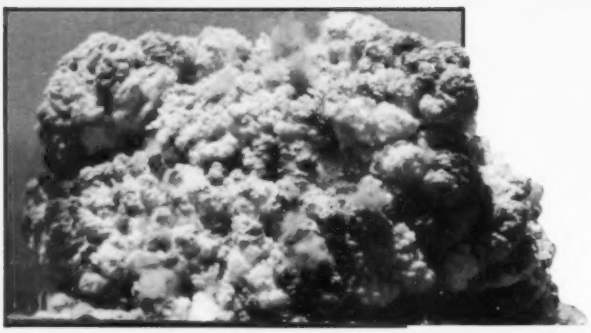
Back to the mylar. Your CEC officer had a most unusual responsibility for this explosive test. The Ballistic Missile Office of the Air Force needed to test the performance of designs being proposed for the mobile launch vehicle for the new small ICBM (the so-called "Midgetman" program.) To get a realistic test, they needed to simulate the phenomenon called the nuclear precursor, which happens when escaping radiation heats the ground in advance of the shock arrival.

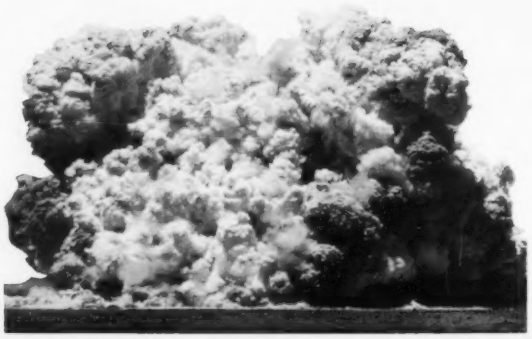
In the layer of heated air above the ground, the toe of the shock wave runs out ahead, "precursing" the arrival of the spherical shock front. Stability in the turbulent vortex beneath this toe is critical for the mobile launcher to be able to stand its ground and shoot back.

The system developed to simulate this precursor uses a layer of helium gas, since the speed of sound propagation in helium is nearly three times faster than the speed in air. Helium, besides making you talk like Donald Duck, is noted for its buoyancy. Think of the last time you bought a helium balloon for your kid, and how he cried when it went floating away. Just as you vowed next time to tie the balloon to his wrist, we had to find a way to tie down the helium.



When the 'dust devil' came, it took 30 people to hold onto each bag . . .





Just when things were going smoothly — the worst happened . . . a 'dust devil' appeared!

It took between two and three hours to deploy each bag, with a crew of about 30 manning each dolly.

Even with 30 people to hold onto each bag, the mylar could not be deployed in winds over 10 knots. Otherwise it would begin to billow out of control and become a shredded mess before its time. Notwithstanding a favorable climatological history during June, we had to wait two days for the winds to die down sufficiently to begin deployment.

Once deployment did finally begin, Murphy struck — at about four o'clock in the morning. An unexpected wind arose, with one of the mylar bags half-deployed, its most vulnerable position. Thanks to the quick response of all hands, and a favorable wind direction, the mylar which was exposed endured 16 hours of winds up to 25 knots with only minimal damage.

Deployment of the mylar resumed at sunset the following evening. A call went out for volunteers to help make up progress lost to wind the night before. The volunteers looked like a ragtag bunch at sunset and even worse by the next morning! (Especially the "moles" who had to crawl along under the bags to fill the sealing trenches with earth.) The augmented crew did the trick, however, and the rising sun found all eight bags properly deployed and ready for inflation with helium.

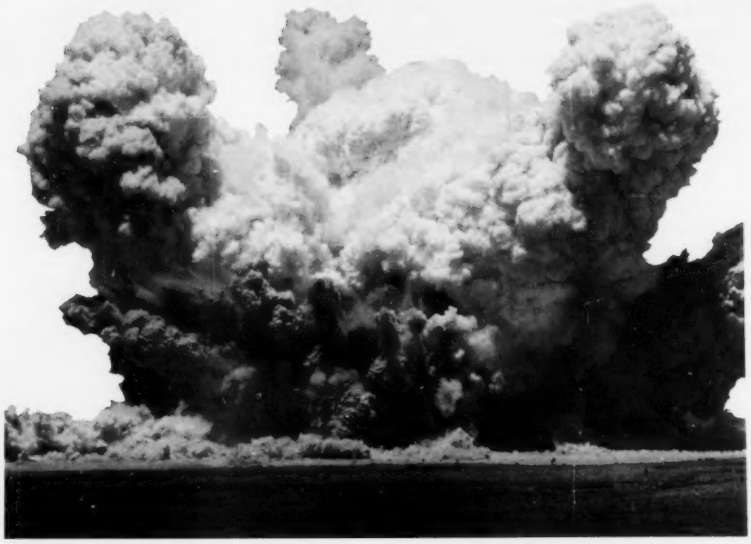
Inflation began about 9:20 am, after system checks were completed. It was impressive to watch eight-and-a-half acres of mylar start to come to life. All eight bags were inflated at the same time, and by about 11:00 am they were all pleasingly plump with helium. Temperatures were rising, winds were light, and the thermal inversion was starting to burn off so the shot could be safely detonated.

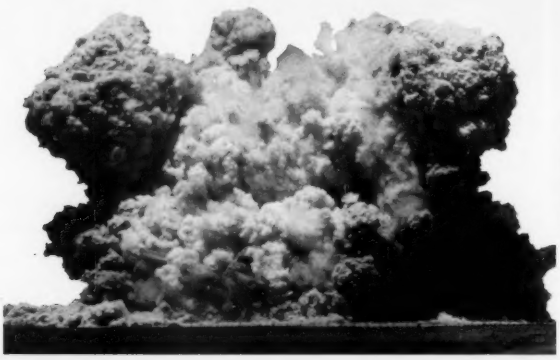
Just when things were going smoothly — the worst happened! As we prepared to evacuate ground zero by switching the helium supply over from the tube trailers to the stationary tanks, a large dust devil appeared just off the south end of the radial. Dust devils are desert whirlwinds which generate locally when temperatures rise, winds are light, and the thermal inversion has burned off. Conditions were perfect. The dust devil tore into bag number eight, farthest from ground zero and demolished it in seconds. Then it skipped along the edge of bags seven through two, sparing them from damage entirely. But it wasn't satisfied yet. It spun its way into bag number one (the fancy one with the arc-shaped end) and ate it for dessert.

Just as we began to recover, along came dust devil number two! We watched in total shock expecting to see the remaining bags meet the same fate as their cousins. But for reasons unknown, the second dust devil traced virtually the same path as the first, and caused no new damage.

Needless to say efforts were accelerated to evacuate the test bed so the shot could be detonated before more bags were lost. The shot went off at 12:20 pm. The films of the event showed that one more bag (number four) was damaged sometime after we left the test bed, but don't suspect the problem was caused by another dust devil.

The bags remaining had enough helium to establish a distinct precursor simulation, although the precursor was not as regular and symmetric as we might have liked.





Conditions were perfect for a 'dust devil,' but it didn't destroy the experiment.

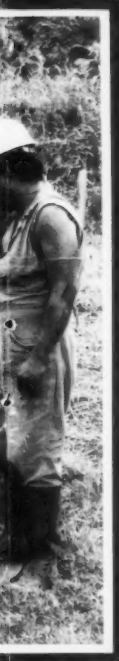
This adventure was made possible by lots of people besides myself. Special mention goes to Sheldahl, Inc., the mylar bag manufacturer; New Mexico Engineering Research Institute, the bag deployers; Science Applications International Corporation, who did the helium flow control; and to LCdr. Gary Reid, CEC, USN, my predecessor and the inventor of the mylar/helium simulator. Next time perhaps we can add Christo himself to the team! □

IT TAKES A SPECIAL BREED of sailor to clean the inside of a boiler. It's all part of a "hands-on" approach in teaching Seabees the "how to" so they can accomplish the "Can Do." NCTC, Gulfport offers the best training possible under the best conditions according to reporter Rod Duren. In 1975, NCTC became the first vocational school in the Navy to gain accreditation. Now 19 formal courses and 164 different special training courses are taught within excess of 9,000 students annually. LEFT: BU3 G. Sloman checks the alignment of bricks during concrete masonry class.

WORK SMARTER, NOT HARDER is the of thumb at PWC, Guam, when it come streamlining methods of operation in t field. Preventative maintenance on all valves is virtually impossible when don ually so a valve tender was purchased all valves are checked annually in a sh period of time and at a savings of many hours. ABOVE: Employees learn the ap tions of the valve tender which is situate a four-wheeled cart and can easily be over man holes.

NAVY PROJECT OF EXCELLENCE — An innovative hard chrome plating process, developed by the Naval Civil Engineering Laboratory, Port Hueneme, Calif., has been selected by the Secretary of Defense as the Navy's Project of Excellence for 1985. At a recent Laboratory assembly, Technical Director Dr. R. N. Storer, (from left) congratulated three members of the team: Charles Imel, Charles Carpenter and Nicholas Olah. RAdm. John Paul Jones, Jr., Commander, Naval Facilities Engineering Command and Chief of Civil Engineers, attended to personally cite the Laboratory and the engineers responsible for the new technology.

SOPHIA K. ASHLEY, senior research mechanical engineer and physicist at the Naval Civil Engineering Laboratory, Port Hueneme, Calif., has been selected as Federal Engineer of the Year for 1985. Shown with RAdm. J. R. Ives of NAVFAC, Ms. Ashley displays her gold medal at ceremonies in Washington, D.C. Ashley gained international recognition with her work and more than 12 nations are requesting her research results. She was born in Corinth, Greece and raised in Athens. She attended Northeast Louisiana University, taught jr. high school for 11 years, and worked for NASA for 2½ years. She has four sisters — all of whom are engineers or scientists.



s the rule
comes to
in the
all water
done man-
ased. Now
a shorter
any man-
he applica-
tuated on
be placed

A BATTLE-GROUND FOR FOUR DAYS happened at Camp Shelby Military Reservation near Hattiesburg, Miss., recently when NMCB-1 conducted their homeport field training exercise. From Monday through Thursday the Seabees trained in chemical, biological and radiological threats and protective measures; field sanitation, first aid, convoy vehicle preparation, land navigation, security patrols, and other phases of warfare. The week had been long, hard and packed full of training, and secretly, the Seabees hoped they would never have to use what they had learned. But preparation is the biggest part of protection and they knew that if they ever were called upon to respond to a crisis — they could respond!

TAKING THE TOWN — Reserve Seabee from RNMCB-24 scouts the dummy village of Deutschville in the Ft. Benning pine woods as Delta Co. conducts annual combat training in realistic field conditions. Six months of training went into this exercise to produce a company fully outfitted, munitioned and rationed for infantry combat against Army Rangers. All part of the annual infantry training required of Seabees.

"GREEN STINGER" CONCEPT DRAWS ATTENTION in mobilization exercises. RNMCB-16 beat the clock again in every operational phase and has met or exceeded every goal in this — the second year of using this method for testing a reserve battalion's mobilization capability. Each of 17 battalions have the mission to be ready for deployment for duty anywhere in the world, and once on site, ready to conduct tactical construction and defensive military operations until relieved. RNMCB-16 did it — struck camp and returned home — and all in record time. In fact, every Air Det involved in Green Stinger so far has beaten the clock in every operational phase.

situation report

The largest offshore construction project to be accomplished by the Navy since 1977 began in January 1986. The project involves fabricating and installing eight offshore towers for the Tactical Air Combat Training System (TACTS) which are to be installed 30 miles southeast of Charleston, S.C., in water depths to 100 feet. The towers will be fabricated in two parts at a Gulf Coast location and barged to the site for installation.

A special offshore derrick barge will be used to make the 500-ton lifts of the tower sections placing the bottom template section on the seafloor so that piles can be driven through the template 300 feet into the seafloor pinning the tower in place. The upper section will be lifted into place on the template and welded. CHESDIV (FPO-1) is managing the design and construction and LCdr. Bertsche is the ROICC.

Recently NAVAIRSYSCOM was tasked by CNO with the job of establishing a program for replacement, modification or service life extension of Aviation Engine Test Facilities (AETF). NAVFACHQ Code 04T3 was requested by NAVAIR to participate in this effort including on-site evaluation of existing hush houses and test cells at major Navy and Marine Corps Air Stations and Naval Air Rework Facilities.

Concurrently, major claimants have identified their AETF future MILCON requirements to NAVAIR. The NAVAIR/NAVFAC team will assess the results of the site survey and the claimant program and advise CNO of recommended priorities and their impact on Naval aviation maintenance.

On the First of October 1985 the officers in charge of Underwater Construction Teams One and Two were commissioned as commanding officers culminating several years of review and approval. The new status of the Underwater Construction Teams emphasizes the unique mission of the Underwater Construction Teams as the only Navy resource for providing responsive underwater construction, repair, maintenance and inspection of harbor, coastal and offshore fixed ocean facilities.

Originally formed as a distinct organization from other Naval Construction Forces (NCF) between 1969 and 1970 attached to the Naval Construction Regiments at Construction Battalion Centers Port Hueneme, Calif., and Davisville, R. I., respectively, UCTs Two and One were formed by TAD assignment of the few dispersed diver trained Seabees assigned to the Naval Mobile Construction Battalions. Underwater Construction Teams One and Two were commissioned as autonomous units commanded by an Officer in Charge on Nov. 1, 1973. UCT One moved to its present home at the Naval Amphibious Base, Little Creek, Va. in May 1974.

Each of the two teams, consisting of 52 enlisted and three officers, dispatches three independent air mobile detachments worldwide throughout its respective hemisphere of responsibility during a typical deployment season from April through September. October through March is spent in professional and combat skills training, equipment upkeep and overhaul, and project planning for the successive deployment season.

The Underwater Construction Teams require highly motivated young Seabees to become Underwater Construction Technicians. Individuals interested in additional information may call Lcdr. K. Gross, CEC, USN at A/V 221-0505 or commercial (202) 325-0505.

In a recent letter to the field, RAdm. J. P. Jones, Jr., established command design policy and philosophy. The policy emphasizes excellence in design and cost-effectiveness in facilities, and the Command's commitment to design principles and practices which are requirements-based, logical and conservative.

The letter underlines the importance of active design management throughout the acquisition process including: requirements development, pre-design direction, design review, and construction follow-through.

The goal is to meet our user's needs with quality facilities that are straight-forward and businesslike, and which reflect responsible use of public funds. In short: responsive, responsible and defensible design.

A significant milestone was reached in the Extremely Low Frequency (ELF) Submarine Transmitting System Program with the beneficial occupancy of the Michigan facilities in January 1986. The dummy load, gate house, and power buildings and part of the transmitter building, were delivered to the Navy. The same day, GTE Sylvania, who is providing the ELF transmitter, started their installation.

Delivery was made in accordance with the original date set forth in the contract due to a concentrated effort on the part of ROICC Great Lakes and their site representative and NORTHDIV. Construction of the system grounds, installation and check-out of the equipment and mitigation of the utility companies is expected to be complete by about April 1987.

On September 25, 1985, RAdm. Jones signed the annual certification report to CNO on the effectiveness of the command's management controls over operations. The annual certification is required by the Federal Managers' Financial Integrity Act of 1982. The act requires ongoing evaluations and reports on the adequacy of the systems of internal accounting and administrative control within each government activity.

The annual certification is based on the results of Management Control Reviews undertaken by the line manager's at each NAVFACENGCOM field activity. Management Control Reviews are detailed examinations of an operation to determine whether adequate controls are established to prevent or detect instances of fraud, waste, or abuse; and to determine whether the controls are working effectively. Management control reviews are being performed in the financial and contract administration functions at all NAVFACENGCOM activities during FY 1985 and 1986.

Projects which have a high potential for significant problems must be identified and managed aggressively from the start. The potential for problems could be because of the type of work, the size, complexity, location, technology, funding limitations, or other factors that introduce uncertainty and risk. Formal policy and procedures on risk management should be issued by Spring 1986. In the interim you should be taking steps to identify and aggressively manage the high risk elements of projects.

The Naval Civil Engineering Laboratory and other supporting laboratories have completed work in a variety of areas which will benefit field activities. The following is a sampling of items recently delivered.

Innovative and Hard Chrome Process. NCEL has developed an innovative and efficient hard chrome plating process through adaption of commercial technology for military application. The process combines the use of reversible part-holding racks, two bus bars, conforming anodes, and a spray rinse system. Benefits include up to a six-fold increase in productivity, consistently uniform and high quality plating, zero-discharge rinsing, reduced energy consumption, and increased operating flexibility.

Steam Trap Improvement. A user's guide with tips on ways to reduce trap losses was published and is in wide use now.

Latex Coatings for Wood. Newly formulated latex coatings for wood, conforming to new California environmental standards, have been developed.

Organotin Analytical Methods. An automated, real time analytical method and prototype for organotin data collection has been developed by the Ocean Systems Center. Organotin based anti-fouling paints are very effective and the Navy is considering their use on ships. This method and prototype will permit stations to survey organotin levels to establish baselines and detect its source. Advanced development of this technology is underway to place this resource in the field as soon as possible.

High Efficiency Anchors. An anchor, specifically designed for use in tandem arrangements, has been designed and tested by NCEL. Because of its greater capacity, it can be lighter, thus its installation can be done with current or smaller vessels and winches. The prototypes validated the predictions regarding its superior performance. Tests in dense sand showed it holds 50% more load than the best conventional anchor. Furthermore, using two anchors in tandem more than doubles the capacity.

Mooring Models. A single composite mooring model was developed and validated using full scale static and dynamic data from NAVFAC's ocean construction platform SEACON. The new model will reduce design risk speed up calculations thus allowing lower cost moorings to be planned.

New Berthing Concepts. Floating, double deck piers, and other new concepts in berthing have been developed by NCEL. Proposed design manual changes and a user data package have been forwarded to NAVFAC and selected engineering field divisions. The floating double deck pier offers markedly superior operational capacity and flexibility benefits compared to conventional piers, yet it costs the same.

USE Program can reduce cost & risk

By RENATO G. DECAL
P. E., Ill. and Wis.
NEESA, Port Hueneme, Calif.

The 1984 amendments to the Resource Conservation and Recovery Act mandate industrial dischargers to minimize hazardous waste generation at their facility. Recognizing the need for reducing hazardous waste generation and disposal, the Department of Defense launched the Used Solvent Elimination (USE) Program.

The purpose of the program is to reduce the present and future risks and costs associated with disposal of used organic solvents by eliminating disposal as far as possible. Instructions for the USE Program implementation were contained in letters from the Chief of Naval Operations (CNO) Chief of Naval Material, and Commander, Naval Facilities Engineering Command.

Basically, industrial activities such as shipyards, Naval Air Rework Facilities (NARF), etc., should have a USE Program in place by October 1986. Other activities generating more than 400 gallons per year of any organic used solvent have a target date of October 1, 1987.

To assist the activities in meeting these deadlines, funds for contract development of USE studies are available through Naval Facilities Engineering Command's (NAVFAC), Defense Environmental Restoration Fund. Furthermore, funding may be available for the procurement of solvent distillation equipment (stills) through NAVFAC's centrally managed funds.

To obtain funding for the USE study and the stills, the activities should contact their cognizant engineering field division (EFD) to prepare and submit a Pollution Control Report for NAVFAC approval.

Figure 1. Small still at Norfolk Naval Shipyard.

Since used oil recycling is strongly encouraged by OPNAVINST 5090.1, and the Environmental Protection Agency may soon classify used oil as a hazardous waste, used oil recycling has been included in the USE study.

The key to a successful recycling program is to keep it simple and to maintain the degree of segregation required.

The most practical used oil and solvent (UO&S) recycling program options are:

- On-site/Off-site reclamation of solvents
- Closed loop recycling of high value hydraulics and lubricants with manufacturers
- Burning of appropriately segregated UO&S in Navy boilers, or
- Sale of UO&S through Defense Property Disposal Office, recently renamed Defense Reutilization and Marketing Office (DRMO).

On-site recycling

On-site recycling of used solvents located as close to the source of generation as possible will usually yield the most cost-effective results. Accordingly, on-site recycling is emphasized as the primary USE program option.

On-site recycling of used solvents involves use of distillation equipment (stills). There are many types of stills commercially available in sizes ranging from 15 gph to over 200 gph. Stills are available which can be run on a batch process or automatic mode. In addition, some are explosion proof and have optional features for easy operation and maintenance.

On-site recycling is currently being practiced at the Norfolk Naval Shipyard Paint Shop utilizing a small still (as shown in Figure 1) with impressive results.

Off-site recycling

Where on-site recycling may not be cost-effective or may be difficult to implement, off-site recycling by commercial contractors offers a viable alternative for recycling UO&S. As in the case of on-site recycling, proper segregation of used solvents must be maintained. Costs for recycling by commercial contractors vary as a function of virgin material costs, volumes, handling and transportation costs, and ease of recycling.

Overall savings of about 20 to 30 percent can be achieved using reclaimed solvents compared to virgin material. There are some companies which provide equipment and solvents for parts cleaning under a lease agreement.

When the solvent gets too dirty, it is replaced by the supplier. Because the solvent is essentially leased out to the customer, this type of operation becomes very attractive for smaller Navy facilities because the supplier assumes all responsibility for the solvent, including ultimate disposal.

Presently, the Construction Equipment Department at Naval Construction Battalion Center (CBC) Port Hueneme is utilizing off-site recycling. Shop personnel are very satisfied with the operations.

Closed-loop recycling

Closed-loop recycling of high-value hydraulics and lubricants with manufacturers is another recycling alternative worth investigating. This option may be employed when large volumes of contaminated high value hydraulics and lubricants are being generated by an activity located near major industrial centers where the manufacturers' processing facilities are available for a reclamation. Under this option, the manufacturer contracts with the activity to perform either of the following tasks:

- Reclaim the used petroleum products and return directly to the activity. A fee is charged per gallon which generally depends on the handling, transportation and processing costs.
- Accept the contaminated petroleum products and give the activity credits on its purchase of virgin materials. This option is not likely to be cost-effective for lubricants which have complex and diverse additive packages and which would require costly requalification testing.

Burning

Burning of appropriately segregated UO&S in Navy boilers has been practiced at some Naval installations. CBC Port Hueneme has burned contaminated oil at five percent blend with fuel oil #5 at the Thompson Boiler Plant without any boiler modifications.

Among the waste solvents being generated at Navy shops, only PD-680 Type II is recommended for blending with fuel oils. Halogenated solvents must be kept segregated and must not be mixed with used oils intended for use as a boiler fuel.

Sale

Sale through DRMO is the least favorable option because before this can be completed, it may go through a reuse, transfer, donation and sale cycle which makes the UO&S available to any federal, state or local government agency upon request and at no economic benefit to the generating activity.

Furthermore, as stated in the aforementioned CNO directive, approval by knowledgeable personnel of a flag officer command is required before this option could be implemented.

Recently, a letter from CNO added an impetus to the recycling of used solvents. The letter directed naval activities to implement a DOD directive that prohibits landfill disposal of certain used solvents immediately. This ban made recycling of used solvents even more desirable since the amount of solvents to be ultimately disposed of after recycling will be reduced by 70 to 80 percent, thereby drastically reducing the disposal cost.

The Naval Energy and Environmental Support Activity (NEESA) has been providing technical and contractual support in the development and execution of the USE Program. NEESA has open-end contracts available to activities interested in recycling UO&S. The contract scope is to develop recycling alternatives that are environmentally sound, implementable and cost-effective for UO&S.

In fiscal year 1985, NEESA provided contractors to conduct the USE studies at the following activities:

- Naval Base Pearl Harbor, Hawaii
- Naval Ship Repair Facility, Yokosuka, Japan
- Naval Ship Repair Facility, Guam
- Naval Construction Battalion Center, Port Hueneme, Calif.

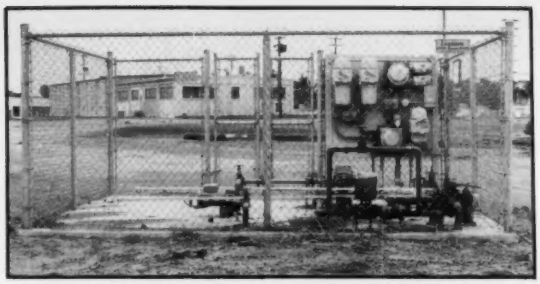


Figure 2. Used oil blending facility at CBC, Port Hueneme, Calif.

- Naval Air Station, Alameda, Calif.

Preliminary findings indicate a potential savings of from $30,000 to $200,000/year from recycling of UO&S.

In fiscal year 1986, NEESA will be providing contractor services for USE studies at many different types of activities contingent upon funding approval. USE studies can be conducted utilizing either of the following approaches:

- Activitywide — if an activity is a major generator of UO&S (shipyards, Ship Repair Facility, Naval Undersea Warfare Engineering Station, Naval Air Station, NARF, etc.).
- Basewide — if a combination of activities that are both large and small generators of UO&S exist within a geographical area (San Diego, Pearl Harbor, Philadelphia, etc.).

A basewide study is preferable because recycling is volume dependent. In addition, implementing a basewide recycling program offers incentives to some activities, classified as small quantity generators, to turn in their appropriately segregated UO&S for recycling thereby resulting in savings from reduced disposal costs.

Activities interested in developing their own USE Program utilizing in-house resources and expertise should obtain a copy of the guidance documents developed by NEESA and NAVFAC. These documents are:

- *Used Oil and Solvent Recycling Guide*. Provides information and guidance for developing and implementing USE programs and for organizing voluntary used oil recycling programs.
- *In-House Solvent Reclamation (NEESA 20.3-012)*. Provides general information on types of solvents used by the Navy, economics and payback potential for solvents and solvent still sizes, and case histories.
- *Guide for Developing a Recyclable Materials Sales Program (NEESA 5-010)*. Provides guidance for establishing waste recycling programs and for taking advantage of previously unrealized resources. It covers potential recyclable materials, program implementation requirements, conducting a feasibility study and operational requirements. Activities selling used oil and solvents through DRMO must have a qualifying recycling program to obtain 100% of the sales proceeds.

It would be advantageous for activities to develop and implement a USE program as soon as possible because funding is still available and an activity will directly benefit from the savings from recycling UO&S. Simply stated, "There's nothing to lose, but something to gain," for the activity. □

World's largest hyperbolic medical facility certified

By DR. MICHAEL YACHNIS
P. E., Va.
Chief Engineer
and
ROBERT JOHNSTON
Certification Engineer

The certification of the world's largest hyperbaric medical treatment facility at Wright-Patterson Air Force Base, Dayton, Ohio was the culmination of a tri-service effort which began in 1978.

Although the facility belongs to the Air Force, the project was managed by the Army Corps of Engineers. At its inception, Congress stipulated that the facility be Navy certified. NAVFAC, as the sole certification authority for shore-based DOD hyperbaric systems, assumed this responsibility.

The certification process is essentially a systematic inspection and testing of all materials, components and procedures in order to insure, to the maximum extent possible, the safety of the facilities' occupants and operators. The NAVFAC System Certification Authority (SCA) is comprised of an interdisciplinary team of engineers under the direction of Dr. Michael Yachnis, Chief Engineer.

In addition to Dr. Yachnis (structural engineer), team members who participated in this project included Bob Johnston (mechanical), Terry Hayes (electrical), John Cecilio (metallurgical) and Rick Rice (fire protection). Technical assistance was also provided by Frank Gorman, head of the NAV FAC hyperbaric facilities design office at Chesapeake Division.

The facility consists of three cylindrical chambers interconnected by passageways in a triangular arrangement. The main chamber, which can accommodate eighteen patients, is 22 feet in diameter. The two smaller chambers are each 11 feet in diameter. The design pressure of all three vessels is 165 feet of seawater (73.5 psig) which corresponds to the maximum pressure required for recompression treatment.

The facility will be used primarly to provide hyperbaric oxygen therapy (HBO) in the main chamber and emergency recompression treatment in one of the smaller chambers. The third chamber acts as an "elevator" to provide personnel access to the other two.

In common with other systems of this scope and complexity, the certification process uncovered a number of technical problems which had to be resolved.

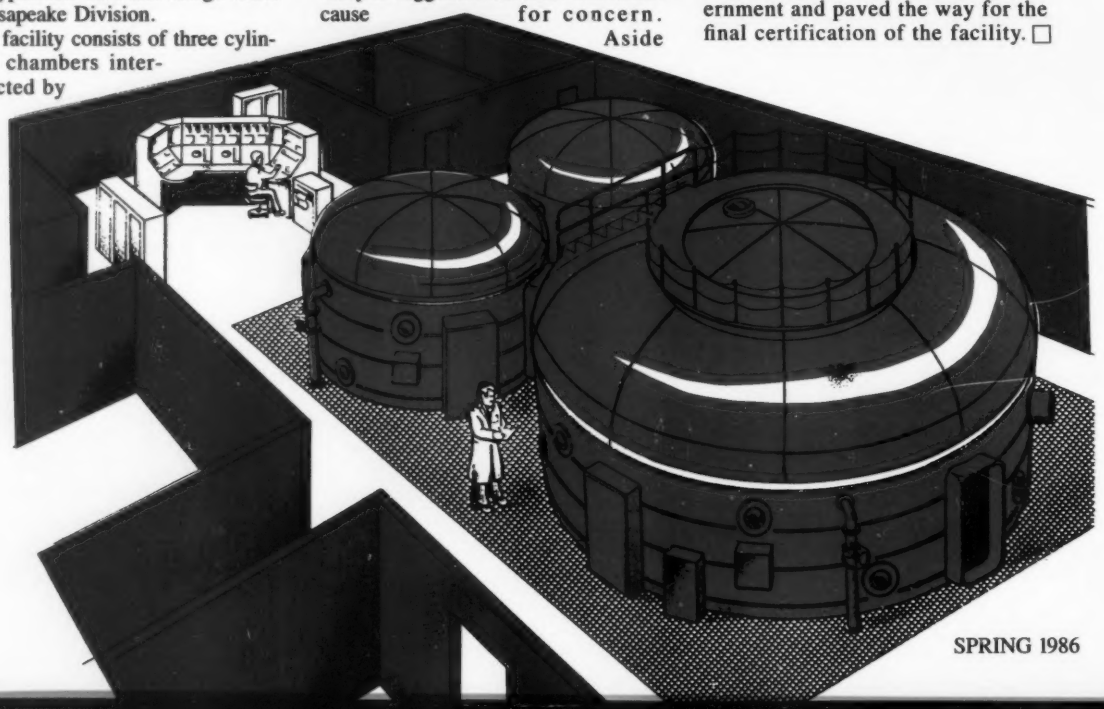
Perhaps the most dramatic of these was the discovery during hydrostatic testing of unusually high strain gage readings at two locations adjacent to the passageways. Further finite element analysis suggested that there was indeed cause for concern. Aside from the almost unthinkable prospect of abandoning the project at such a late stage there were three realistic options:

1. "De-rate" the vessels; that is certify them only for operational limits at which these high stresses were not apparent.
2. Add reinforcing "stiffners" to the chamber shell.
3. Perform additional strain gage testing and analysis to more accurately determine the nature and extent of the high stress concentrations.

The first option was unacceptable to the Air Force as it would unduly restrict their operational scenarios. The second option was considered only as a last resort, for both technical and economic reasons. Thus, the approach taken by the Certification Team was to require an additional strain gage analysis while the vessels were subjected to a pneumatic test.

The second test, performed by the Air Force Flight Dynamics Laboratory, indicated that while there were some very localized regions of high stress, they were within allowable limits, as defined by the ASME Boiler and Pressure Vessel Code.

The subsequent judgement that the vessels were acceptable as built resulted in significant savings to the government and paved the way for the final certification of the facility. □



When work becomes fun!

By LT(JG) RICHARD ROOT, CEC, USNR

For everyone in Public Works or the Officer in Charge of Construction (OICC) Organization supporting the fleet, customer relations are a constant concern. Efforts in construction, repair and other facility services are often regarded by the customer as too little and too late. On Okinawa, Japan, the Civil Engineer Corps Officers and facility engineers assigned to support Marine Corps Base Camp Smedley D. Butler often find the U.S. Marine Corps a demanding customer. It is the reputation of the Marines to have a "take charge/make the dust fly" approach to business — be it infantry training or facilities improvement.

On Okinawa the Marines take training very seriously, and their Mecca for training is a remote, sparcely populated and expansive acreage of jungle and hills known as Northern Training Area (NTA). A three-hour drive from the crowded MCB Camp Butler Headquarters at Camp Foster, NTA provides an ideal environment for survival and combat training. Operated by the III Marine Amphibious (MAF), NTA has a small permanent staff which oversees training and camp facilities.

Since the training facilities at NTA were of temporary construction, the III MAF requested the renovation of several facilities, including a survival training device known as the "Slide for Life." The slide consists of a tower, a splash pond and an overhead cable supported by poles from the tower and over the splash pond.

Using the slide involves riding a pully mounted handle down the cable from the tower; once over the pond the handle is released, resulting in (hopefully), an injury-free splash down. The "Slide for Life" ride at NTA only lasts about ten, terror-filled, seconds.

LCdr. Neil Hall, Assistant Public Works Officer for MCB Camp Butler, with experience in the U.S. Army Special Forces, put his Airborne-Ranger experience to good use. LCdr. Hall directed a design which included prestressed, wire-wound concrete support poles and a new 3 1/4-inch wire rope slide. Cargo nets were strategically placed to catch the unfortunate who might release his grip too early or too late.

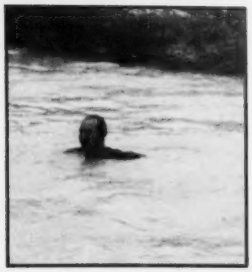
Upon completion of the design, plans were forwarded to OICC Okinawa, the contract awarded, the submittal process expedited and work started. Progress was rapid. As final inspection approached, LCdr. Hall suggested that the PW/OICC team show the Marines the CEC "can-do" spirit. A bright, clear morning on Okinawa found LCdr. Hall, Lt(jg). Root and project AREICC Nestor Folta ready to perform the final inspection.

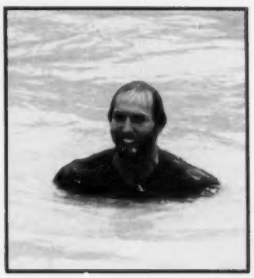
Lt(jg). Root, as project AROICC, slide down the wire first — khakis and all. LCdr. Hall went second and Nestor Folta third. Nestor had so much fun he almost went fourth as well. No casualties or serious form breaks were reported, and the Marines accepted the new "Slide for Life."

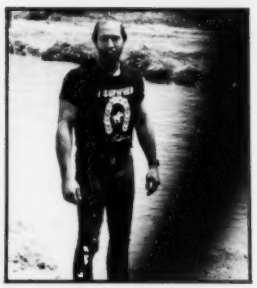
MSGT Ynclain, NTA chief instructor, declared the sliders impressive enough to be "Okinawa Marines." There were also reports of "congratulations" from the formerly skeptical Marines who never thought they'd get their product in record time.

At MCB Camp Butler, Okinawa, the "Slide for Life" project is a success story. The project shows good OICC/PW customer relations can be achieved by a simple formula: take a personal interest in the customers' operational needs. All projects do not progress as smoothly and quickly as the "Slide for Life," however. If the customer believes that PW/OICC are involved, interested and knowledgeable of his facility problems and making their best efforts to punctually solve them, good customer relations are inevitable. □

Nestor Folta about to begin the "Slide for Life."







Folta survives the slide though soaking wet.

A new construction material to consider — sulphur concrete

By LCDR. K. W. MLYNARSKI, USNR, CEC
Chief, Branch of Construction Materials
Bureau of Mines
U.S. Dept. of the Interior, Washington, D.C.

and

W. C. McBEE
Supervisory Metallurgist
Albany Research Center, Bureau of Mines
U.S. Dept. of the Interior, Albany

Sulfur concrete is a thermoplastic material produced by mixing modified sulfur with mineral filler and aggregate in the proper proportions at 280°F (138°C). The molten sulfur cement acts as the binder for the concrete, instead of Portland cement and water, producing, upon cooling, a high-strength concrete with an average compressive strength of 7,000 psi (48 MPa).

Since there is no alkaline Portland cement binder in the mix, sulfur concrete is a highly acid-resistant structural material, making it suitable for either cast-in-place or precast construction of floors, walls, sump basins, trenches, pump basins, and other items.

Because of sulfur concrete's thermoplastic characteristic, the material's high mechanical strength properties are achieved rapidly upon solidification. The material achieves 80 percent of its ultimate strength in a few hours with 100 percent achieved in approximately 30 days.

In addition to the rapid strength gain, the thermoplastic characteristics of sulfur concrete offer some other useful advantages. It can be poured in below freezing temperature and can be readily recycled by remelting and recasting without loss of mechanical properties.

The thermoplastic nature of sulfur concrete also poses some limitations. The material will melt if exposed to prolonged temperature over the melting point of the cement, thus losing its structural integrity. The sulfur concrete properties will not be affected on short exposure to elevated temperatures, however, because the material is a poor thermal conductor. Maximum operating temperature is 190°F (88°C). The material will burn if exposed to open flame; however, the concrete does not contain sufficient sulfur to support combustion when the flame is extinguished.

Mobile 12 t/h sulphur concrete mixing unit

Modification of Sulfur

The use of sulfur as a construction material was proposed as early as World War I, when an acid-resistant mortar compound of 40 percent sand and 60 percent sulfur was used. Thermal cycling of these mortars caused loss of strength, however, leading to cracking and failure.

Sulfur as a binder for concrete also as investigated, but it was discovered that during the solidification of molten sulfur concrete, elemental sulfur underwent an allotropic crystalline transformation from the monoclinic form to the more dense orthorhombic crystalline form. This set up residual stresses, making it susceptible to cracking after freeze-thaw cycling.

Beginning in the early 1970s, the U.S. Bureau of Mines began developing a modification process to stabilize this crystalline transformation of sulfur. The modification process uses dicyclopentadiene and oligomers of cyclopentadiene to plasticize the sulfur and produce a polymeric polysulfide cement for use in preparing durable sulfur concretes.

The advancement in the sulfur concrete technology finally consolidated the characteristics of corrosion resistance, high strength, and durability into one structural material, making it feasible to completely replace or overlay deteriorated concrete surfaces. The process is now used commercially in the United States with several contractors engaged in the manufacture and installation of the material.

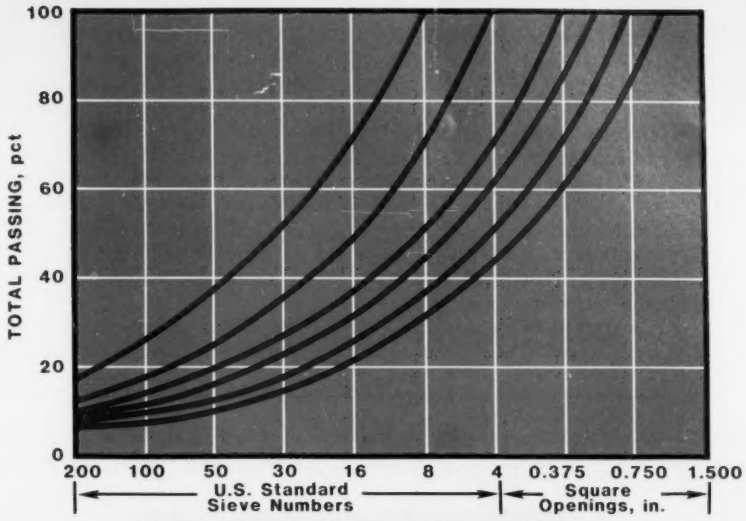
Mixture Design Considerations

Sulfur concrete mixtures are designed to achieve maximum strength, maximum density, low void levels, and very low moisture absorption.

While the materials exhibit mechanical properties comparable to those of PCC, most of the mixture design considerations are similar to those for hot mix asphaltic concrete.

Good-quality aggregates are required for corrosion-resistant sulfur concrete. Aggregates must be clean, sound, free of swelling clays, and exhibit low moisture absorption (less than 1%). Aggregates that are insoluble in acids, such as quartz, are used for preparing acid-resistant sulfur concrete. If corrosion is from salt alone, limestone aggregates may be used.

Cement requirements are minimized by dense grading the aggregate. A graduation chart used for preparing dense-graded aggregate mixtures for sulfur concrete is shown.



Aggregate graduation curves, dense graded.

Material Preparation

The concrete is prepared by hot mixing the cement and aggregate in a temperature range of 257° to 302°F (125° to 150°C). Any type of mixer can be used that will provide a homogeneous mixture and maintain the desired temperature. Preparing sulfur concrete for industrial evaluation has been done in equipment ranging from 2-L (0.5-gal) bench-scale-type bread mixers to 6.1-m^3 (8-yd^3) ready-mix concrete mixers and hot mix asphalt plants.

The resultant product is cast into the desired shape using conventional forms (steel or wood) and, on cooling to ambient temperatures, forms and finished product. The process is thermosetting and reversible; therefore, the sulfur concrete products can be recycled.

Evaluation of Modified Sulfur Concrete Used in Industrial Plants

Beginning in 1977, a cooperative industrial test program was initiated in conjunction with The Sulphur Institute to test sulfur concrete in corrosive industrial environments. The major objectives of the program were to establish the feasibility of using the concrete in large-scale applications and to determine the ultimate longevity of the material under actual operating conditions in problem environments.

Initially, components such as tiles, slabs, tanks, and pump foundations were precast, and subsequently placed in industrial plants. When larger scale prototype equipment was developed for concrete production, larger scale projects were conducted on site. A summary of the tests, and results obtained on exposure to different chemical environments are presented in tables.

Major industrial corrosion problems are created by mineral acids or mineral acid-metallic ion species. In these areas, many replicate tests were included. Test components included materials fabricated with and without the use of reinforcing steel. Fifty test environments are involved in cooperation with 40 industrial companies.

The plants include metal production and refining operations for aluminum, copper, nickel, lead, manganese, magnesium, titanium, uranium, vanadium, zinc, and precious metals, and chemical and fertilizer production plants for phosphoric, sulfuric, chromic, and nitric acids, and sodium and potassium salts.

While the evaluation of corrosion-resistant sulfur concrete in industrial applications is continuing, results to date have shown the potential of the material for use in many corrosive environments where other materials fail. The major use areas of most promise are those exposed to corrosive electrolytes and acid and salt solutions that now cause major damage to PCC cells, floors, foundations, and equipment. For specific types of corrosion, such as hydrofluoric acid, a specialized type of concrete using dense graphite aggre-

Description	Number
Precast tests:	
1,000-gal sump tank	3
400-gal basin	2
4- by 4-ft by 4-in slab	8
3- by 3-ft by 3-in slab	17
2- by 2-ft by 3-in slab	45
8- by 8-ft by 4-in foundation unit	2
4- by 4- by 6-ft weir tank	3
2- by 4-ft pump foundation	2
Tile loading dock	1
Tile drain ditch	1
Mechanical test specimens	181
In situ tests:	
37,000 ft^2 floor	4
Pump foundations	6
Sumps	3
Acid loading dock	1
Metric equivalents:	
ft = 0.3048 m	
ft^2 = 0.0929 m^2	
gal = 3.7854 L	
in = 25.4 mm	

Industrial Test Summary

	Sulfur concrete	Regular PCC
Strength, psi:		
Compressive	7,000-9,000	3,500-5,000
Splitting tensile	1,000-1,100	500
Flexural	1,350-1,700	535
Coefficient of thermal expansion µin/in °C	14.0 -14.7	12
Moisture absorption, pct	0.0 - 0.10	0.30-3.0
Air void content, pct	3.0	4.0
Modulus of elasticity, 10^6 psi	4.0	4.0
Specific gravity	2.40- 2.50	2.5
Impact strength, ft-lb:		
Compressive	100-110	
Flexural	0.3-0.5	
Mix proportions, wt pct	14-18 sulfur 6-9 filler 38-42 sand 33-37 coarse aggregate	7 water 15 cement 30 sand 45 coarse aggregate

Properties of typical sulphur concretes and Portland cement concrete.

gate and modified-sulfur cement is required.

Results show that sulfur concrete materials performed well in the majority of corrosive atmospheres. Material deteriorated in hot chromic acid solutions, sodium hydroxide solutions of more than 10 percent concentration, sodium chlorate-hypochlorite, copper slimes, and hot organic solvent solutions. Failures also resulted in areas where the material was exposed to temperatures in excess of 230°F (110°C).

The durability and longevity of sulfur concrete is being established. The oldest corrosive-resistant test materials are components in sulfuric acid solutions and in copper electrolytic solutions. These units have shown no evidence of corrosion or deterioration after seven years of service. Since sulfur concrete is a relatively new material, continued testing will be necessary to fully establish its service life.

Summary and Conculsions

Corrosion-resistant sulfur concrete materials have been developed for use in acidic and salt environments where PCC materials fail. Industrial testing has shown that these materials are durable in 50 different process environments. The materials exhibit excellent mechanical properties when compared to PCC. Sulfur concrete shows great promise for applications in the chemical, metallurgical, and fertilizer industries. Other potential use areas include marine environments and highway and bridge areas where salt corrosion is a problem. □

Quality Circles: their use as motivators for design excellence

By LCDR. NEIL B. HALL
R.A., Pa.
R.L.A., Minn.
P.E., Minn.

Officers in the Civil Engineer Corps (CEC) enjoy being assigned as project managers, coordinating those who design something and those who watch it getting built. In private industry the roles are usually combined. The client hires the design firm to administer the construction contract. In government contracting, the players are kept separate. Despite similar schooling, experience and professional registration, the working relationship between public works engineers and ROICC construction representatives can become intense.

There is a tendency on the part of public works engineers to perceive the "plans and specs" as the final product, with no regard for work-in-place. This short-sightedness is not necessarily the fault of the design engineer. The career path of a Navy design professional is often removed from a true appreciation of the job site and the ultimate final product. This action not only precludes an appreciation for the principles of field engineering and an empathetic relationship with constructability, but also discredits the feedback which serves as positive reinforcement for a job well done, and as lessons learned for the next (and even better) project.

Andy Duran explains an A-E study.

At the Public Works Branch of Marine Corps Base Camp Smedley D. Butler, Okinawa, a "quality circle" was developed to strengthen the working relationship between the design engineer and the construction representatives from the neighboring OICC Okinawa. The goal of the quality circle was to improve the quality of both in-house and A-E design work, in order to effect a complete and useable facility, satisfactory to the customer, on-time and under-cost.

The designer must develop a scheme in recognition of all pertinent design criteria, principles of constructability, and both stated and unstated program requirements.

Much of today's design is bland because much of the decision-making associated with design is made by non-designers. An ambitious engineer is often faced with the choice of jumping into "management" or remaining a "glorified draftsman." One overriding objective of the quality circle was to make the public works engineer both capable and responsible for as many design decisions as possible, so that decision making could be neither abdicated by the designer nor usurped by a nonprofessional.

Prior to establishing the quality circle, the Public Works Branch reviewed its concerns for the engineering product, as well as for its in-house engineers and architects. These concerns centered around four areas, as follows:

Concern Number One: the knowledge gap. The design engineer is faced with a tremendous burden of information overload. His formally learned skills fall victim to entropy while modern technologies zoom by exponentially. Chances are he or she knows less about computer programming than the typing pool.

The need for engineers to grow professionally is innate, and must be satisfied by management. On Okinawa, where the size of the design staff is small, there is often little opportunity for on-site, resident instruction, and training funds are limited.

The quality circle needed to recognize this shortfall, and provide relevant training to engineers and architects: as refresher for lost skills, to enhance their professional knowledge, and to offer training in associated disciplines and new technologies.

To meet this requirement, the projects to be discussed at the quality circle are screened for teaching points and lessons learned. "Mini-classes" are taught on the spot by guest speakers, in areas such as asbestos removal and vibration control in buildings: topics too small to formalize, but too important to let slip by.

Concern Number Two: appreciation for field engineering. Every manager, with an eye on the calendar, laments the degree of fussiness associated with engineering drawings. Practically every attempt to enhance productivity through systems drafting is foiled by a draftsman who sees cut-and-paste drafting as just too darn ugly. As long as he or she remains uninitiated to the full scope of the project, the construction drawing, and not the work-in-place, is perceptually the final product.

Furthermore, the designer receives little feedback as to the correctness of his design solution: most change orders are accomplished in the field with little communication back to the designer. While the public works designer is often accused of living in an ivory tower, he or she is more likely "imprisoned" by time constraints and by well-meaning efforts to avoid incorrectly duplicating the role of the construction representative. The quality circle needed to provide a forum for the design engineer and the construction representative to compare notes, discuss lessons learned, and work out standard procedures.

Concern Number Three: getting the big picture. The designer is often uninformed about financial constraints (until breaking one), collateral equipment requirements (an electrical engineer completed a lighting system design before discovering the customer had devised an office landscape plan), or new criteria.

The criteria problem is an expanding one. Today the newest concern is asbestos. Tomorrow it will surely be formaldehyde. Each government agency is developing criteria and rules with a phenomenal impact on the design engineer. Often the rules conflict.

Criteria management is a messy business with a lot of finger pointing.

Much criteria was identified at the 100%s. The customer presumed public works to be a one-stop shop for facilities expertise, but the designer considered certain criteria to be nonengineering, customer-generated input.

The quality circle was developed as a forum to get all of this out in the open. Although each project would be discussed on it own merits, much learned about criteria, such as sprinkler systems, asbestos removal, preventive medicine and health issues, would be educational and useable on many type projects. Specialists such as the preventive medicine officer and the base safety officer have given "guest crits" to explain criteria unfamiliar to design engineers, such as radiation protection and design in the noise environment.

Facility planners, as well as ROICC construction representatives, are often invited to discuss the projects. At one quality circle a planner was explaining why multi-use buildings often have difficulty getting programmed. "What's a category code?" asked the architect. From this, management identified the need to provide its design team with an overview of the Shore Facilities Planning System and a one-hour mini-class ensued, which greatly enhanced the designer's ability to understand limitations placed on the initial project scope.

Continued on next page

64 graduate CECOS

The Civil Engineer Corps gained 64 new members in September 1985 when Basic Class No. 176 graduated from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. All have accepted assignments in locations around the world.

The graduates completed eight weeks of specialized training pertinent to the school's needs for shore installation engineering, public works management and Seabee operations.

Ten students finished with honors: Lt. Gerald R. Manley was the outstanding graduate. Nine others graduated "with distinction." Lt. Manley's photograph is indicated by (★). Those with distinction are indicate by (•), and those entering Seabee duty by (†).

★Lt. Gerald R. Manley
BSCE/Virginia Mil Inst
to Gulfport, Miss.

Ens. Kimberly K. Anderson
BSOE/U.S. Naval Academy
to Pearl Harbor, HI

Ens. Stephen M. Azzinari
BSCE/Univ of New Orleans
to Guantanamo Bay, Cuba

Ens. Jeffery R. Baker
BSAE/Cal Poly Univ
to Yokosuka, Japan

Ens. James P. Beckett
BS Structures/Cornell Univ
to Philadelphia, Pa.

•†CWO2 Dwight Benton
to Port Hueneme, Calif.

Ens. Lynne M. Bever
BSOE/U.S. Naval Academy
to San Diego, Calif.

Ens. Daniel J. Bollman
BSCE/Michigan State Univ
to Great Lakes, Ill.

Ens. Jeffery T. Borowy
BSCE/Ohio Northern Univ
to Great Lakes, Ill.

Ens. James A. Bray
BACE/Michigan Tech Univ
to Guam

Ens. Edward W. Brown
BSCE/N J Inst of Tech
to Cherry Point, N.C.

Ens. Kevin H. Bunker
BSCE/Michigan State Univ
to San Diego, Calif.

•Lt. Henry F. Burns
BSME/U.S. Naval Academy
to Charleston, S.C.

Ens. Donald R. Chandler
B ARCH/Univ of Idaho
to Moffett Field, Calif.

Ens. Stephen J. Coffey
BSCE/Univ of Massachusetts to
Lakehurst, N.J.

Continued on next page

Ens. Antonio Cruseilles
BSME/NJ Inst of Tech
to Madrid, Spain

Ens. Andrew W. Dufour
BSME/Georgia Inst of Tech
to Meridian, Miss.

†Ens. Dennis L. Duren
BSCE/Univ of NE-Lincoln
to Gulfport, Miss.

•Ens. John H. Edwards
BSME/U.S. Naval Academy
to Yorktown, Va.

Ens. Steven C. Fischer
BSCE/Univ of NE-Lincoln
to Fallon, Nev.

Ens. Charles M. Foster
BSME/Memphis State U.
to Adak, Alaska

Ens. Alex M. Gavrishoff
BSGE/Montana College to
Keflavik, Iceland

•Ens. Susan P. Globokar
MSCE/Cleveland State U.
to Sewells Point, Va.

Ens. C. J. Griffith
BSGE/U.S. Naval Academy
to Cherry Point, N.C.

Ens. Deanna L. Hawkins
MSEE/Tuskegee Inst.
to Moffett, Calif.

Ens. Jeffery S. Hoel
BSCE/The Citadel
to Key West, Fla.

Ens. Nell R. Hough
BSCE/Old Dominion Univ
to Keflavik, Iceland

Ens. Michael D. Huggins
BSME/U.S. Naval Academy
to Beaufort, S.C.

Ens. Irene K. Lee
BSCE/S. D. State Univ
to Newport, R.I.

Ens. Mark L. Leemaster
BSCE/Cal Poly State Univ
to El Centro, Calif.

Ens. Mark R. Libonate
BS ARCH/U.S.N. Academy
to La Maddalena, Italy

Ens. A. E. Lipowicz
BSCE/Lawrence I of Tech
to Cherry Point, N.C.

Ens. Scott R. Lister
BSPE/Texas Tech Univ
to Pax River, Md.

Ens. Daniel T. Magro
BS/Univ of Wyoming
to El Centro, Calif.

Ens. Derwood J. Mason
BSCE/Sycracuse Univ
to Long Beach, Calif.

Ens. Steven G. Mills
BSME/University of Utah
to Travis, AFB, Calif.

Concern Number Four: pride in work. Everyone takes pride in their work, and everyone likes a pat on the back. The typical design engineer is often in "nametag defilade," in the back corner of the room, permitted only to sign his initials in the lower right hand corner of a size F mylar.

The quality circle instills pride in each engineer or architect because each individual designer of an in-house project, and every EIC of an A-E design, is routinely called upon to present his own work. The designer introduces the project, describes the scope of work, and proceeds to summarize high points and low points of the actual design. If the project has not gone to bid, the construction representative might do an on-the-spot constructability review.

The senior board member for A-E contracts might check the final A&E product against the negotiated scope of work. Another engineer might comment on a design omission. If the project has already been built, the construction rep might report lessons learned. Guest consultants, customers, engineers, and architects provide fresh and interesting approaches to the design solution. The best quality circles are the ones where engineers of one discipline question the traditional approach of another.

Management attends the quality circle, often in the form of moderator, but more often as note-taker, looking for new innovations, value engineered solutions and listening for ways to improve the team approach to design/build. The purpose of management is not to distribute blame but to encourage quality growth.

There has developed a mutual respect between the design engineers and the field representatives. Each has learned to understand the constraints placed on the other, and the PW/OICC "romance" is off to a fine courtship. Communications up and down the line have likewise improved, because there is now a forum for engineers to escape the anonymity of their workspace, and offer alternative solutions to a jury of their peers and higher level management.

Each quality circle is different. Each provides a unique circumstance, but at the same time provides a unified theme of design principles that must be followed.

Here are a few pointers on starting the quality circle.

- Projects are selected to enhance lessons learned, to encourage interaction of all disciplines, and to foster a team approach to design/build. Don't pick a highly technical project that's hard to understand.
- Don't meet on Friday afternoon (we meet every other Thursday for a two-hour session). The quality circle is an important contributor to quality and productivity, and should not be perceived as "happy hour."
- Invite guest consultants. This reinforces the designer's appreciation to use special resources, and insure that the information put out at the quality circle is established criteria and not speculation.
- Finally, encourage creative and innovative thought. Never put the designer in the frustrating mode of asking, "why did they invite me here if they don't want to hear what I have to say?"

All CEC officers should appreciate the fruits of the quality circle. The fellow who designed that building, and the fellow watching it get built, may not lie down together like the biblical lion and lamb, but guaranteed their working relationship will be an improvement over the mongoose-habu fight we so often host at pre-cons and site visits. Most importantly, the final product — a complete and useable facility, satisfactory to the customer, on time and under cost — will get done with an enhanced sense of quality. □

Pearl Harbor Shipyard CPAF utilities contract completed

By JEANNE A. LIGHT
Public Affairs Officer
NAVFAC, Pearl Harbor

For a select group of people working for a Navy construction office, it was a happy-sad occasion. Work on a history-making project in Hawaii was all but finished. These workers were proud of the part they played in such a project, but sad because as a close-knit group, they were breaking up. Some would go to work with other activities; others would be seeking work outside the Navy, but for the most part, their day-to-day contact with each other would cease.

The project involved was one of the largest CPAF (cost-plus-award-fee) contracts ever to be awarded in Hawaii in recent years for repair and upgrade of the utility distribution systems serving the Pearl Harbor Naval Shipyard area.

From the start, when PacDiv first requested authority to negotiate and award the utilities improvement projects in October 1981, those involved knew the undertaking would be a challenge. The majority of the equipment and utility distribution systems serving the area was constructed in the 1940s.

By the late 1960s, on-going maintenance became insufficient to insure reliable service. Numerous breaks were occurring and there was a tremendous waste of energy due to leaks in compressed air and steam distribution systems. Military construction (MCON) documents were submitted but funding was never approved.

By the early 1980s, the situation was considered to be too critical to defer any longer. That's when former PacDiv Commander RAdm. Howard H. Haynes made a successful in-person appeal in Washington for funds and authority to proceed with award of a CPAF contract.

Prior to the start of the project in October 1982, Harold Nishimura, head of the PacDiv utilities division, noted that the upgrading of utilities in the shipyard was long overdue.

"We've never done anything to expand or improve the utilities systems that were installed some 40 years ago," he said. "You can't expect those same systems to continue to adequately service a shipyard that has expanded and grown and developed over a 40-year period."

A CPAF contract differs from other Navy contracts in that it pays the contractor for all costs incurred plus an award fee based on his performance in meeting deadlines and budgets.

According to Don Inouye, senior construction manager for the project, the CPAF concept was selected because of uncertainties in the need to work around the shipyard operations and underground conditions. The shipyard's $300 million a year operation could not be disrupted.

Further, the systems to be replaced were constructed at a time when drawings and documentation were either not very good or were lost in the shuffle of war-time support. The exact location of existing utilities and physical obstructions to routing were impossible to verify without a tremendous amount of field work. Because of these factors, a "lump sum" contract would more than likely result in much higher costs.

Hawaiian Dredging & Construction, a subsidiary of the Dillingham Corporation, was selected on the basis of the company's qualifications. Negotiations brought a cost estimate of $29.5 million, and the contract was awarded on Sept. 30, 1982.

A construction management office was set up under the control of the Resident Officer in Charge of Construction (ROICC) office at the Shipyard. "Initially the ROICC offices were located in a shipyard warehouse," Inouye said. For a time, they moved off-base in the industrial area by the Honolulu International Airport. Later, seven trailer-type buildings were brought to the Hospital Point area at

•Ens. Kelly L. Myers
BSME/U.S. Naval Academy to Orlando, Fla.

Ens. Marc A. Myrum
BSCE/Michigan Tech Univ to China Lake, Calif.

Ens. Toan D. Nguyen
BSCE/Bucknell Univ to Pearl Harbor, Hawaii

•Ltjg. Michael J. O'Connor
BSME/Penn State Univ to Jacksonville, Fla.

•†Ens. William R. O'Donnell
BSME/Univ of Lowell to Gulfport, Miss.

Ens. Kathleen O'Neill
BSME/U.S. Naval Academy to Japan

†Ens. Doh-Won Park
MSCE/Colombia Univ to Port Hueneme, Calif.

Ens. Debra L. Peck
BSGE/U.S. Naval Academy to Pensacola, Fla.

•Ens. Michael L. Petouhoff
BSSE/U.S. Naval Academy to Kingsville, Tex.

Ens. Bradford W. Plom
AA/Ball State Univ to Annapolis, Md.

Ens. Catherine E. Powell
AERO ENG/Univ of Southern Calif. to El Toro, Calif.

Ens. John C. Roener
BSOE/U.S. Naval Academy to Brooklyn, N.Y.

Ens. Robert L. Russell
BSCE/N. C. State to Norfolk, Va.

Ens. Timothy M. Schoenborn
BS/U.S. Naval Academy to Willow Grove, Pa.

Continued on next page

†Ens. James H. Schroeder
MS CHE/Texas A&M Univ
to Gulfport, Miss.

†Ens. Scott G. Smith
BSME/U.S. Naval Academy
to Gulfport, Miss.

•†Ens. Steven H. Stevenson
BSME/U.S. Naval Academy
to Coronado, Calif.

†Ens. William D. Tate
BSME/Univ of Maine
to Port Hueneme, Calif.

Ens. Timothy J. Twomey
BSCE/Univ of Arizona
to Guam

Ens. Ryan K. Vanommeren
BSME/S. D. State Univ
to Fallon, Nev.

Ens. Jeffery Vaughn
BSCE/Univ of Florida
to Jacksonville, Fla.

Ens. Franz K. Wagner
BSME/U.S. Naval Academy
to Portsmouth, N.H.

Ens. Anne M. Werner
BSCE/Univ of Missouri
to Okinawa, Japan

Ens. Michael K. Westmoreland
BSCE/Univ of Texas
to Chasefield, Tex.

Ens. Don M. Weston
BSCE/Clemson Univ
to Camp Pendleton, Calif.

Ens. Anne Y. Wyman-Young
M ARCH/Univ of Texas-Austin to Lakehurst, N.J.

Ens. Ashley P. Yetman
BSME/U.S. Naval Academy
to Portsmouth, Va.

†Lt. Isara Yimphanich
BSCE/King Mongkut Inst of Tech to Navy

the shipyard to house Navy and contractor personnel.

The contractor and Navy personnel met weekly to review progress and to schedule future work. This coordination was critical so as to not interfere with ship movements and scheduled shipyard work. The CPAF concept of contracting allowed changes to schedules and areas without long, drawn out negotiations.

The contractor's costs were continuously audited and validated and he was reimbursed accordingly. Because the project was not fragmented into many separate contracts with numerous prime and subcontractors, it was easier to reschedule work to other areas without interferences or conflicts.

In March 1984, when the contract was about 67 percent complete, a $14.3 million change order was negotiated to include three additional projects.

The benefits that resulted from the contract were amazing. Large energy savings — an estimated $1.45 million per year for compressed air and $500,000 per year for steam systems — resulted when the leaks were fixed.

Of the 470 utility crossing, 40 percent were not shown on the drawings. There were even abandoned fuel lines with fuel still in them. Twenty-six major schedule changes in the work areas were made due to Shipyard requirements. However, because of the method of contracting and good communication between the contractor and the Navy, these problems were easily solved.

"The bragging point of this contract," said Inouye, "is that there was no lost production time or unforeseen interferences with Shipyard operations over the entire contract period."

Replacement and upgrading the salt water system has shown significant increases in flow and pressure. A built-in provision in the system allows the launching of "pigs" (large plastic swirling devices) to clean out the piping and prevent marine growth from degrading the system capacity.

Upgrades to the shorepower capacity will prevent any delays or curtailments in repair and overhaul of newer ships and submarines by the Shipyard. The electrical capacity was more than doubled from 2250 KVA to 5000 KVA.

Inouye noted that the contract was completed three and one-half months ahead of schedule and within the available funds. The $45.2 million dollar construction cost was within three percent of the $43.8 million estimate. There was $2.2 million in unforeseen work, bringing the total to $47.4 million, a change order rate of under five percent.

"To keep the total costs that close to the estimate in a cost-plus contract is almost unheard of," said Inouye. "NavFac established a goal of keeping the change order rate under five percent and we did that." The total cost for the entire project was $50.2 million.

The construction work was completed August 30, 1985, and the ROICC offices and contractor personnel were demobilized in October.

Capt. Henry J. Rinnert, OICC Mid-Pac, assembled the small group of workers left to handle the remaining administrative details, and presented each of them with a letter of appreciation for a job well done. Of the more than 30 Navy people directly connected with the contract since its beginning, the majority had already left for other jobs in other places. Five were on hand to receive the letters in person. They included Cowen Azuma, Jerry Choy, Joe Souza, Stuart Gurney and Judy Neuburger.

While the trailers can still be seen on the lot near Hospital Point, they now sit vacant, waiting to be moved to other locations for other purposes. Inouye, who assumed managerial responsibilities of the contract in July 1984, has returned to PacDiv to coordinate all the details that come with closing out a contract of this size.

He summed up his experience by saying, "It was fun. Everyone — the contractor personnel and the Navy people — worked well together. It was like we were a separate organization. We functioned pretty much independently, but we got the job done and we did it well."

He also noted that everyone involved was pleased with the outcome. The shipyard has a much improved utilities system, and the Public Works Center employees won't have to spend their time on frustrating repairs.

"All the people involved with this project — those at the Naval Station, at the Public Works Center, and the Shipyard — are to be commended," Inouye said. "Their tremendous support and active participation helped keep the shipyard operations going while still allowing the contractor to do his work. □

Grads accept assignments worldwide

March 12, 1986 was a special day for 26 young naval officers. That was the day they graduated from Basic Class No. 177 at the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. All accepted assignments in various locations — both at home and abroad.

The members of Class No. 177 completed eight weeks of specialized training pertinent to the school's needs for shore installation engineering, public works management, and Seabee operations.

Four members finished with honors: Lt(jg.) Paul A. Soares was the outstanding graduate. Graduating with distinction were Ens. David B. Cortinas, Ens. Ben D. Pina, and Lt. Robert P. Walden.

Lt.(jg). Soares' photograph is indicated by a (★). Those graduating with distinction are indicated by a (•), and those entering Seabee duty are indicated by a (†).

Graduation exercises were held in the CECOS Auditorium at 1000. The invocation was given by Lt. Timothy C. Sims, CHC, USN; The master of ceremonies was LCdr. Joseph G. A. Riccio, Jr., CEC, USN, CECOS Executive Officer; and the introductions were made by CECOS Commanding Officer Capt. Brian J. O'Connell, CEC, USN. The principal speaker for the ceremonies was Capt. Julian M. F. Kau, CEC, USN, Commanding Officer, Northern Division, NAVFAC, Philadelphia, Pa.

‡★Lt.(jg.) Paul A. Soares
BSRM/U.S. Naval Academy
to NMCB-4, Port Hueneme, Calif.

Ens. Mark A. Bergin
BSCE/Univ. of Alaska
to NAVSUPPFORANTARCTICA

Ens. William M. Breedlove
BSCHE/Univ. of Tennessee
to OICC Guam

†•Ens. David B. Cortinas
BSCE/Texas A&I Univ.
to NMCB-3, Port Hueneme, Calif.

Ens. John R. Ehlert
BSCE/Michigan Tech Univ.
to PGSCH Monterey, Calif.

Ens. Joseph E. Ervin
BSCE/Univ. of Washington
to NAVSTA Rodman, Panama

Ens. Thomas A. Gewlik
BSCE/Texas Tech Univ.
to NAVWEAPSTA Earle, N.J.

Ens. David W. Herriot
BSME/Portland State Univ.
to NAS Memphis, Tenn.

Ens. Gerald D. Job
BSME/Portland State Univ.
to PWC San Diego, Calif.

Lt. Scott L. Killinger
BSCE/Univ. of Illinois
to PWC San Diego, Calif.

†Ens. Bruce A. Martin
BSME/Christ Bros. College
to NCTC Gulfport, Miss.

Lt. Apryl D. McMillier
BSCE/Purdue University
to WESTDIV CONT OFC, Vallejo, Calif.

Lt. Charles C. Miller
BSME/U.S. Naval Academy
to LANTDIV CONT OFC, NAS, Oceana, Va.

Lt. Roger M. Natsuhara
BSCE/UC Berkeley
to PWC Guam

•Ens. Ben D. Pina
BSCE/N. Mexico State Univ.
to Portsmouth NSYD
Portsmouth, N.H.

Ens. John D. Puglisi
BSME/U.S. Naval Academy
to OICC MED CONT OFC, Naf Sigonella

Ens., Max D. Rodgers
BSOE/Florida Inst of Tech
to SOUTHDIV CONTOFC, Barksdale, La.

Lt. Harold NMN Schillinger
BECE/Vanderbuilt Univ.
to PWC Pearl Harbor, Hawaii

Lt. James K. Sellers
BSCE/Univ. of Texas to
LANTDIV CONT OFC, Sewells Point, Va.

†Ens. Ian M. Smith
BSEC/Princeton Univ.
to NMCB-1, Gulfport, Miss.

Lt.(jg.) Theodore E. Spear
BSME/Univ. of Santa Clara
to PWC, Guam

†Lt. James J. Stasse
BSME/Univ. of Seattle, Wash.
to NMCB-133, Gulfport, Miss.

Ens. James M. Thompson
BME/Villanova Univ.
to NAVFAC Adak, Alaska

Ens. Tyler M. Vassar
BSME/Univ. of Tennessee
to NAVCOMSTA Stockton, Calif.

•Lt. Robert P. Weldon
BSCE/Auburn Univ.
to NAVSHIPYD Charleston, S.C.

Ens. Lysil G. Wohlschlager
BSCE/Montana State Univ.
to NAS Whidbey Island, Wash.

Ens. Karen M. Zapp
BSGE/So. Dak. Sch of Mines & Tech to Clark, AFB

In the past, photos of CECOS basic class graduates could not be published until about four months after graduation. This was due to the fact that photos were not received in time to feed into the publications process. Special arrangements now make it possible to publish within a few weeks after graduation. In this issue, two classes are published in order to become current. Note that class No. 177 graduated on March 12, closer to distribution of this issue.

comments/questions

Author wants all No. 133 survivors to have Fall Issue

I want to compliment you on your Fall issue, cover and contents. I didn't realize you had the item on the Indianapolis, but it was most appropriate to use it with the Iwo Jima article. I believe most of your readers will like it. . . .

I wish there was some way to get a copy (of the Fall Issue) to all survivors of #133; I've sent a copy to Captain Murphy already. I like the cover. I appreciate your work, also Vic Transano's and Gayla's.

Ted Murphy
Professor Emeretus, CECOS

Thank's for the compliments and for the article on Iwo Jima. Copies of the fall issue were sent to all members of #133.

Comments on Model Installations Program

I was very interested in the recent article by Lt. Taunton on the Model Installations Program (Fall '85). In my civilian job with the Logistics Management Institute, I have had the opportunity to work quite closely with Mr. Bob Stone, the creator of MIP. In his position as Deputy Assistant Secretary of Defense for Installations, Mr. Stone has played a key role in developing strategies for improving installation management. The Model Installations Program is just one of several initiatives DoD is using to improve effectiveness and cut costs. The commercial activities or A76 program is probably the largest.

Although many people see this program as an attempt to contract out civil service jobs, the real purpose is to ensure efficiency of operation through competition. We found in a recent study that savings of 25% could be realized through A76 competition regardless of whether the government or the contractor won.

Other initiatives include the DRIS program and the Efficiency Review Program. The common thread among all these programs is to encourage installation managers to take a fresh look at their operations rather than continuing in the business-as-usual mode. I would call attention to the fact pointed out in Lt. Taunton's article that 90% of the MIP waivers requested were for self-imposed restrictions; the bottom line is that installation managers need to be much more active in seeking out new and better ways to operate. The DoD policies have set the tone and provided an impetus, now it's up to the managers in the field to make it happen.

D.K. Ault, LCdr., CEC, USNR-R
XO, RNMCB-23, Ft. Belvoir, Va.

Thank you for your comments and interest.

Reader objects to terminology and . . .

Having recently participated in the first national holiday honoring Dr. Martin Luther King, Jr., and having just finished reading the Chief's article on the preceding page, I found M. C. Koblos' article "Another Dawn for Management" very troubling (p. 8, Winter 1986 issue).

What troubles me is that the entire first half of the article makes unsubstantiated statements as though they are fact when they are merely opinions. What troubles me is that the author uses value laden terms such as *"cowering conformity," " prideful emulation," "whining protest"* and *"energetic advocacy,"* all of which tell us more about the author's values rather than provide us an objective treatment of the subject. What troubles me is that the author talks about the greater cost of previous enterprises without discussing the greater or lesser benefits derived from these enterprises. Am I to assume that the vast resources that went into the civil rights movement of the 1960s, at a tremendous cost, was a managerial error?

RAdm. Jones discusses the dynamic process of acquiring a sense of personal accountability. It is essential to our corporate success. This personal accountability reflects a responsiblility to others — whether a family or team as noted in RAdm. Jones' article — or to others who are dependent on our actions. I do not feel a sense of societal guilt for the ills the author notes, but I do feel a sense of responsibility to use my skills, ability and position to foster a healthful environment and equal opportunities for others. These responsibilities go far beyond the requirements of my present billet.

The newspapers and TV recently carried the story of the first black family to move into an all white neighborhood in Philadelphia being burned out of their new home. I wonder if this black family considers themselves to be responsible for their condition? I wonder if those responsible for the fire were cowering in conformity to someone else who they pridefully emulated? I wonder what this whining protest was an energetic advocacy of? I wonder if it is the author's premise that this action (setting the fire) is what society considers to be the appropriate "take charge" managerial response today?

Thank you for your letter, Captain, it's nice to know that someone is reading more than one of our articles. Your analysis may cause others to review those articles again and perhaps send us their impressions of the points you brought up.
Captain R. D. Eber
CEC, USN

Have you considered the Reserves?

For a challenging, rewarding career . . .

If you are a young construction professional in civilian practice or civil service, or are a graduating engineering or architecture college senior who has already selected a civilian career path, the Reserve CEC may have a place for you as a commissioned officer.

Qualified young professionals have the chance to achieve tremendous personal and professional satisfaction through . . .

- Direct appointment as an ensign, Civil Engineer Corps, United States Naval Reserve
- Challenging assignments within Reserve Naval Construction Force units in your geographic locale, in areas paralleling active CEC duty in the Seabees or in facilities' management
- Annual active duty for training that is meaningful and rewarding
- Development of leadership and technical skills that will carry over directly into your civilian profession
- New and lasting friendships and associations with other top-notch construction professionals
- Pay and responsibility that increases as you grow and advance
- A Naval Reserve retirement package for a little something extra in your old age
- Finally, and most importantly, the pride in knowing that you are helping preserve the freedom of your country as you grow in your profession

Here's what you can do . . .

If you are a young engineer or architect, male or female, please call the Reserve Representative listed below.

LCdr. Howard M. Lewis
Eastern Region, RNCF
Bldg. 662, Naval Base
Philadelphia, PA 19112
Phone: (215) 897-5831/34
AV 443-5831/34

LCdr. Howard H. Huggins
Southern Region, RNCF
Naval Base
Charleston, SC 29408
Phone: (803) 743-2650/4322
AV 794-2650/4322

Lt. Robert D. McClure
Central Region, RNCF
Bldg. 1, Naval Base
Great Lakes, IL 60088
Phone: (312) 688-6955/6
AV 792-6955/6

LCdr. John A. Fessler
Western Region, RNCF
1220 Pacific Highway, Suite 227
San Diego, CA 92132
Phone: (619) 696-5401/2
AV 958-5401

Or, contact an Active Duty EFD Accessions Officer listed on the inside front cover for further information and details . . .

Call now (collect)

Now . . . qualified college grads can earn more than

$1,000 per month

in the Civil Engineer Corps

details on inside front cover

. . . or, have you considered the Reserves?

see inside back cover

NAVY CIVIL ENGR MAGAZINE (USPS 560-950) I00037 0
UNIVERSITY MICROFILMS
SERIALS ACQUSITIONS
300 N ZEBB RD
ANN ARBOR MI 48106

Navy Civil Engineer
Bldg. 41, Naval School Civil Engineer Corps
Port Hueneme, CA 93043

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE $300

Second-Class Mail
Postage and Fees Paid
Navy Civil Engineer Corps
ISSN 0096-98419